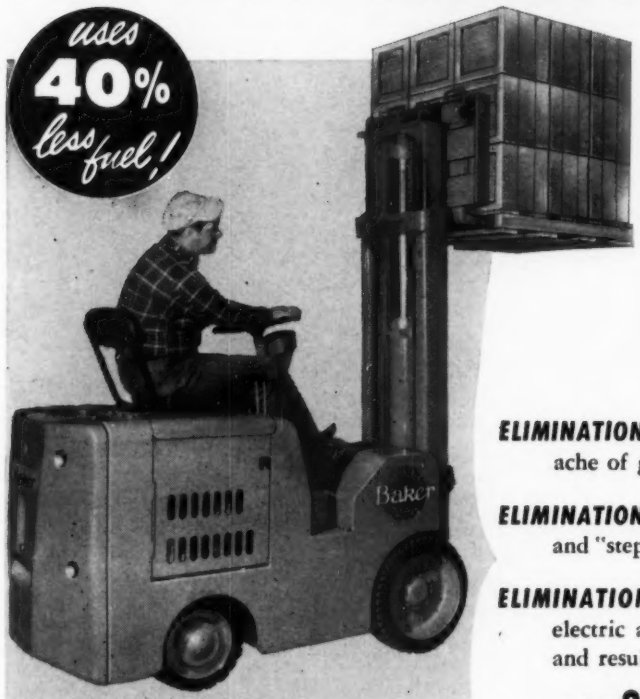
# NEW BAKER gas-O-matic

## . . . ELECTRIC TRUCK OPERATING ECONOMY
## . . . . . GAS TRUCK INITIAL COST !




**gas-O-matic** is a revolutionary new gasoline-powered fork truck with electric motor drive—designed from engine to drive wheels to incorporate the best features of both gas and electric trucks.

The secret of its outstanding performance and amazing operating economy is the new Baker GAS-O-MATIC transmission system. A specially designed variable voltage generator provides an incredibly smooth *unbroken* acceleration curve —directly controlled by the gas throttle.

***ELIMINATION OF CLUTCH*** cures the biggest maintenance headache of gas-powered trucks.

***ELIMINATION OF CLUTCH AND GEAR SHIFT*** prevents jerky starts and "step-ladder" acceleration.

***ELIMINATION OF CONTROLLER AND RESISTANCE BANKS*** of electric and gas-electric trucks means fewer moving parts and results in less down time and lower maintenance costs.

**gas-O-matic** will do everything a comparable straight gas truck can do—do most of it better and more economically . . . plus some things that straight gas cannot do.

It will do almost everything a battery-powered fork truck can do—and some of it better . . . plus a few things that battery-power cannot do!

—Yet it costs little more* than a straight gas truck of the same capacity, and only about half as much as a battery-powered electric with charger and two batteries!

**gas-O-matic** has the smoothest acceleration and best "inching" characteristics of any fork truck, regardless of type of fuel or transmission. It is ideal for ramp work, for tiering, and for long or short haul operations. In fact it will perform almost any fork truck job better and cheaper.

THE BAKER-RAULANG CO. 1853 1953 THE BAKER-RAULANG CO.

* **gas-O-matic** *model illustrated, 4,000 lb. capacity costs only* **$4895.00**

*write for descriptive Bulletin No. 1344*

**THE BAKER-RAULANG COMPANY**
**1251 WEST 80th STREET • CLEVELAND 2, OHIO**

**Baker**
**industrial trucks**

*The Baker-Lull Corporation, Subsidiary, Minneapolis, Minnesota*
*Material Handling and Construction Equipment*

**For more facts circle 502 on Reply Card**

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# 'ROUND ABOUT with the editors in field and office

*Edited by R. L. Marinello*

## Display of Electrical Devices To Tour the Country

AUTOMATION has been put on wheels by the Westinghouse Electric Corp. Developed by the Standard Control Div., the display coach will show how common electrical devices such as linestarters, control stations, motors, and circuit breakers—the "nuts and bolts" of any electrical system—can be used to achieve successful automation.

To make it as easy as possible for maintenance people, supervisory personnel and design engineers to attend a showing, Westinghouse takes the coach right to the plant and runs consecutive 1½-hour programs for groups of ten to twelve engineers at a time.

The coach is starting its country-wide tour in the mid-western sector. It is expected that the coach will make some 350 plant visits during 14 months.

## PE Wins Safety Award

FOR THE fourth time PLANT ENGINEERING has received the National Safety Council's Public Interest Award. This noncompetitive award is made annually to public information media for exceptional service to safety.

The awards went to 16 daily and seven weekly newspapers, 79 radio and 16 television stations, four radio networks, eight general circulation and 21 specialized magazines, 19 advertisers, and 13 outdoor and transportation advertising companies.

PLANT ENGINEERING is proud to be listed with the other specialized magazines which received this safety award.

## Personnel Changes

**Franz F. Kaiser** was recently appointed chief industrial engineer for Fairbanks, Morse and Co., Chicago. His duties will pertain to plant layout, plant engineering, tool engineering, processing, work standards and time study.

**L. S. Houk** was recently appointed manager of manufacturing for consumer products of Westinghouse Electric Corp. He will be responsible for manufacturing functions through the company's consumer products divisions, which include electric appliances, television and radio, lamps and electronic tubes.

On January 1, 1949, he was appointed director of building construction and maintenance for the Headquarters Manufacturing Division and earlier this year was named director of works engineering for the same division.

**Walter W. Wendelken** will take over the job of director of works engineering for the Headquarters Manufacturing Division of Westinghouse. He has had a long career in works engineering in Westinghouse since its beginning in 1917 at the East Pittsburgh works in the power plant department.

**Edward W. Forth** was recently named assistant plant superintendent of DeWalt, Inc., subsidiary of American Machine and Foundry Co.

**Bruce W. Klein** has been appointed chief engineer of the automotive products section of Marshall-Eclipse Division of Bendix Aviation Corp. **F. William Aldrich** will take over the duties of assistant chief engineer.

## How About Your Idea?

A PORTION of the page taken from *A-C Spotlight*, published by the Pittsburgh Works of the Allis-Chalmers Manufacturing Co., is reproduced below.

PLANT ENGINEERING is always interested in hearing what other readers have suggested in the way of plant operating improvements. As can be seen above, your ideas will pay-off in more ways than one if you submit them to PLANT ENGINEERING for consideration for publication.

If you have an idea which may benefit other plant engineers, just write the Editor, PLANT ENGINEERING, 110 South Dearborn St., Chicago 3, Illinois.

*Additional Pay-off!*

L. to R.—Joe Phillips and Tom Keogh, Secretary of our Suggestion System.

**In addition to the $10.00 Suggestion Award presented to him by A-C, Joe Phillips of the Columbus Radiator Section received a check for $10.00 from the Technical Publishing Company for the following article which describes his suggestion in their monthly magazine, "Plant Engineering."**

## Methods Improvement Contest

THE INDUSTRIAL Management Society is now accepting entries for its Third Annual Methods Improvement Contest to be held in conjunction with its 17th National Time and Motion Study and Management Clinic, November 4, 5 and 6, 1953 at the Sheraton Hotel, Chicago.

Student groups in colleges and universities studying industrial engineering, as well as industrial plants and companies are invited to submit entries in the com-

*Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64, P. L. & R. authorized by Post Office.*

## User Explains How Armstrong Unit Trapping Boosted Output:

# Need for Investment in New Steam Equipment Eliminated by Only $550.00 in Steam Traps

THIS is a story about greatly increased efficiency in a laundry, but the principles involved apply to any plant using steam heated equipment.

In speaking of the benefits derived from Armstrong Unit Trapping, Earl Fast of Soft Water Laundry and Cleaners, Long Beach, California, said, *"It's like a man with dirty eyeglasses—he thinks he's seeing perfectly until he cleans the glasses and finds out what he has missed."*

Mr. Fast's plant modernized its entire return system in 24 hours, installing 71 Armstrong traps costing about $550, with these results:

1. Capacity of machines costing as much as $15,000 per unit increased to the extent that new machines are not now required.
2. Higher quality of ironing and finishing, with touch-up on shirts eliminated.
3. Worthwhile fuel savings.

*"Our boiler was turning out plenty of steam," continued Mr. Fast, "but we weren't getting the benefit of it. The best power plant in the world is of no value if you don't use its produced steam to maximum efficiency."*

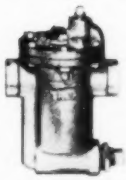
And there lies the case for Armstrong Unit Trapping, which discharges air and condensate as fast as it accumulates to keep steam heated equipment hot and producing at a peak rate. Your local Armstrong Representative will be glad to survey your condensate drainage system without obligation. Call him or write:

**ARMSTRONG MACHINE WORKS**

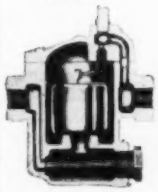
912 Maple Street • Three Rivers, Michigan

### *Traps with Built-in Strainers Cut Costs*

Because the piping at Soft Water Laundry was old, the smallest-sized traps needed protection against dirt and scale. Armstrong No. 880 and 881 traps with built-in strainers were the logical answer because:



1. They cost less than a separate trap plus a strainer.
2. They eliminate external fittings and considerable installation labor.



*Left*—Cut-away view showing strainer screen at trap inlet. Strainer can be cleaned without removing or shutting off steam.

**You always get more out of equipment when you use Armstrong "Unit Trapping"**

**FREE**
**44-PAGE STEAM TRAP BOOK**
Gives Complete Information
MAIL TODAY!

*FILL IN AND CLIP TO YOUR COMPANY LETTERHEAD*

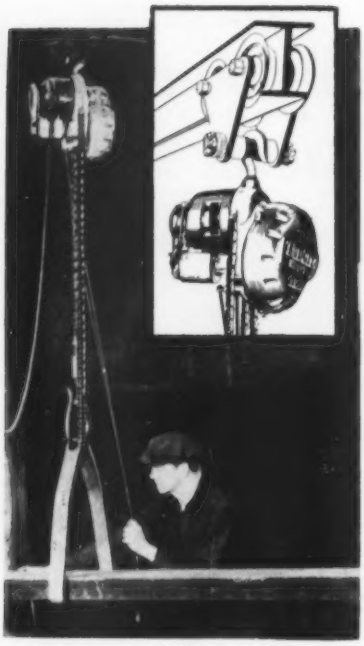
ARMSTRONG MACHINE WORKS
912 Maple Street, Three Rivers, Michigan

Please send me a Steam Trap Book.

*Name* .....

*Title* .....

For more facts circle 503 on Reply Card



**PAYS FOR ITSELF IN SAVINGS**

**A few cents' worth of current a day is all the 'Budgit' Electric Hoist uses to step up production speed and efficiency. In less than two seconds, the ¼-ton 'Budgit' lifts the full load one foot. A slight pull on the control cord starts this fast lifting action. One hand is always free to guide the load. No muscle strain. No more injuries or time out due to the hazards of heavy manual lifting.**

**For the safety of workers and faster handling of defense and civilian production, use the money-saving 'Budgit' Electric Hoist. It's a rugged, portable hoist. No extras to buy. No installation expense. Just hang up, plug in, and the 'Budgit' is ready to cut costs for you. Capacities range from 250 to 4,000 lbs. AC and DC models. Prices start at $129. Ask your nearby "Shaw-Box" Distributor to give you complete details — or write for Bulletin 391.**

**'BUDGIT' CORD REELS increase the operating range of any make hoist, portable tool, or mobile device with a motor up to and including 1 HP. Cable reels off in all directions.**

MAXWELL MANNING, MAXWELL & MOORE, INC. MUSKEGON, MICHIGAN

**'Budgit'®**

**ELECTRIC HOISTS**

**MANNING, MAXWELL & MOORE, INC.**
**MUSKEGON, MICHIGAN**

Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' Industrial Instruments, and Aircraft Products.

**For more facts circle 504 on Reply Card**

# 'ROUND ABOUT

petition. The Society will award first, second and third place plaques to winning schools and companies. Individuals responsible for the improvements will receive certificates of merit.

Participants must register by August 1, 1953, and all entries must be complete and in the office of the Society by September 25th.

Rules and regulations for the 1953 Methods Improvement Contest may be obtained by writing to the Industrial Management Society, 35 East Wacker Drive, Chicago 1, Illinois.

## Plant Engineer Moves Up

**Francis A. Yost** was recently appointed construction engineer for the Pittsburgh Corning Corp. He will act as a construction consultant, with emphasis on cold storage work.

Mr. Yost was formerly plant engineer for Fried and Reineman Packing Co. In addition to being the former president of the Plant Engineering Association of Pittsburgh, he is also a member of the Engineering Society of Western Pennsylvania, the Professional Engineering Fraternity and the American Institute of Electrical Engineers.

## Spray Painting Course

THE SCHEDULE for the latter half of 1953 was recently announced by the DeVilbiss Co. for courses of instruction in industrial spray finishing methods in its School of Spray Painting.

Applications should be made as early as possible for enrolling foremen, shop superintendents, maintenance supervisors, spray operators and any others who wish to attend the week-long classes. The class periods will begin on the following dates: July 13, August 17, September 14, October 12, November 9 and December 7. Instructions will be held in the school headquarters adjoining the main plant at Toledo.

Applications for all classes on the schedule should be sent to the DeVilbiss Co., Toledo 1, Ohio. There is no charge for attending, the only expenses being transportation, board and lodging.

## Plant Engineers Are All-Rounders

THE ANNUAL dinner meeting of the Incorporated Plant Engineers, held in London, was attended by 150 members and guests.

During the talks that followed the dinner meeting, R. S. Davenport, first president of the Institution, remarked that there was a determination that Incorporated Plant Engineers should develop on strictly professional lines and that the highest standards should be maintained.

In response to his remarks, Sir Norman Kipping, Director-General, Federation of British Industries, said that the plant engineer was the outstanding surviving example of the all-rounder in the engineering world, and it was significant that it had become necessary to create a specialist organization for all-rounders.

## On Reducing Accident Costs

THE FINAL LEAFLET "Reducing Accident Costs Through Selling Safety to Supervisors and Workers," completes the series of booklets outlining a well-rounded safety program for manufacturers.

Other leaflets in the series are: Reducing Accident Costs in Small Industrial Plants, Reducing Accident Costs Through Safe Working Conditions, Reducing Accident Costs by Use of Safety Committees, Reducing Accident Costs Through Reports and Records, and Reducing Accident Costs Through Safe Working Methods.

The leaflets, either individually or the entire series, are available free on request from Small Defense Plants Administration field offices.

## Industrial Landscaping Awards

TO ENCOURAGE and stimulate more interest in the landscaping and beautification of industrial and trade buildings, the American Association of Nurserymen will present nine Industrial Landscaping Awards in the form of engraved certificates.

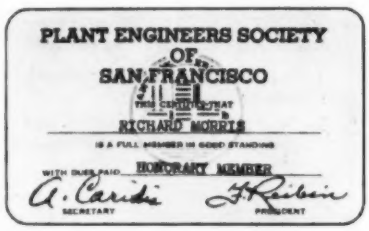
Seven regional and two national awards will be given. Any company that has beautified a property by landscaping in the past three years is eligible to compete. All entries must be submitted by September 1, 1953.

A folder relating to the awards may be obtained from Dr. Richard P. White, Executive Secretary of the American Association of Nurserymen, 635 Southern Building, Washington 5, D. C.

## Honorary Member

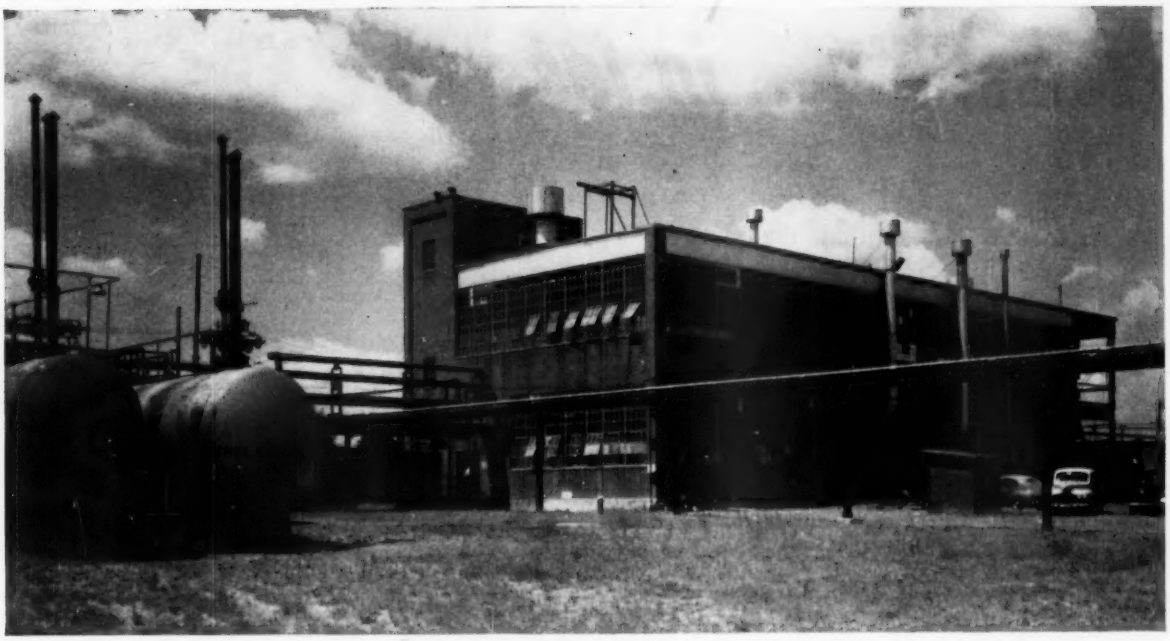
RECENTLY, Richard H. Morris, Editorial Director of PLANT ENGINEERING, received a letter from the President of the Plant Engineers' Society of San Francisco. A portion of the letter is quoted:

"I am enclosing a membership card


PLANT ENGINEERS SOCIETY
OF
SAN FRANCISCO
THIS CERTIFICATE
IS
RICHARD MORRIS
IS A FULL MEMBER IN GOOD STANDING
WITH DUES PAID HONORARY MEMBER
SECRETARY PRESIDENT

for you as a member of our group. Having helped to start the Plant Engineers' Society of San Francisco, we thought you might like to be included as an Honorary Member who is always welcome at our meetings." *Fred Reibin, President, Plant Engineers' Society of San Francisco.*

*Oh, I see*



. . . they're using

our valves at

GOODYEAR

The Goodyear Chemigum Plant at Akron relies on perfect valve functioning . . . precise flow control with valves that are dependable, just as you may. Their choice throughout this plant is OIC.

You pay no extras for OIC's precision engineering, even though you do get longer, trouble-free valve service. In addition, OIC offers you engineering assistance to help you select valves best suited for the job.

If you could see them made, you'd make OIC Valves your first choice when you want dependability.

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

OIC FOUNDED 1903

VALVES | FORGED & CAST STEEL, IRON & BRONZE, LUBRICATED PLUG VALVES

For more facts circle 505 on Reply Card

# NEW I-T-E 225-ampere "J" frame circuit breaker provides extra versatility... *in less space*

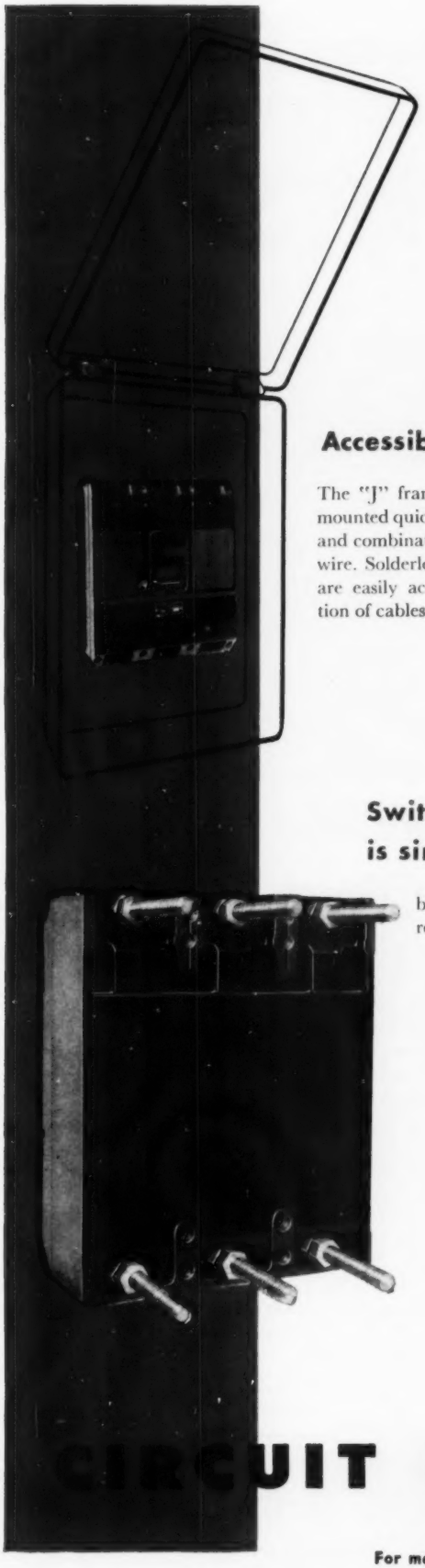
Shorter by *4½ inches* than the plant-proved I-T-E "K" frame circuit breaker, the compact new "J" frame still provides the same outstanding protective features.

In switchboards, distribution-type panelboards, power panels, bus plugs, combination motor starters, and all types of individual enclosures—the "J" frame cuts space requirements considerably.

The "J" frame circuit breaker operates on common trip principle; an overcurrent on *any* pole opens *all* poles simultaneously. Mechanism is quick-make, quick-break—trip-free. Thermal-magnetic tripping provides complete protection against overloads and short circuits. Three-position operating handle visually indicates when the circuit breaker is ON, TRIPPED, or OFF.

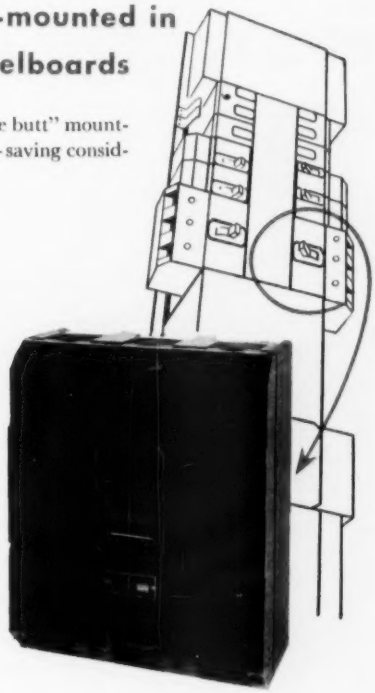
Special auxiliary devices—shunt trips, undervoltage trips, auxiliary switches, and alarm switches—can be mounted *within the circuit breaker case.*

I-T-E MOLDED CASE



## Now...two 225-ampere breakers can be parallel-mounted in convertible panelboards

Reduced size allows "double butt" mounting of "J" frame breakers—saving considerable space.



## Accessibility is increased

The "J" frame circuit breaker can be mounted quickly in individual enclosures and combination motor starters. Easy to wire. Solderless, pressure-type terminals are easily accessible for quick connection of cables.

## Switchboard mounting is simplified

by use of rear connection studs. Easy front removal of breakers. Safe. Saves time.



***Available in ratings from—***

70 to 225 amperes
2- and 3-pole (3-pole case construction only)
600 volts a-c
250 volts d-c
15,000 amperes interrupting capacity—NEMA

## Save time, save space . . . without sacrificing quality

Standardize on I-T-E circuit breakers to assure service continuity, simplified maintenance, a single source for system expansion or replacements, and—*always*—the same proved I-T-E dependability throughout. *I-T-E Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia 30, Pa.*

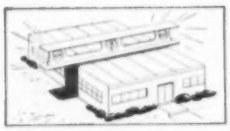
# CIRCUIT BREAKERS

**For more facts circle 506 on Reply Card**

# Smooth-surfaced asbestos roof
# FOR DEAD-LEVEL DECKS!

## The Johns-Manville Flexstone Special Built-up Roof

***NO SLAG - NO GRAVEL***



The J-M Asbestos FLEX-STONE* SPECIAL Roof has been developed for decks from dead level to ½" incline per foot. This new Flexstone specification uses coal tar roofing pitch as the cementing agent. It is the result of extensive experimentation in the Johns-Manville Research Center and years of successful tests in the field. Now for the first time you can have the advantages listed below on a flat or nearly flat roof deck construction.

1. **No gravel or slag**—cuts down excess weight and saves labor costs!
2. **Smooth-surfaced** to afford good drainage and make maintenance and alterations easier!
3. **Asbestos**—J-M Flexstone Felts are made of fire, rot and weatherproof asbestos. They last longer and give more enduring protection.
4. **Won't dry out**—Because they are made of mineral asbestos, Flexstone Felts are unique in their resistance to the destructive effect of sun!

For added protection, the J-M Asbestile* System of Flashing insures proper treatment of all critical areas. Asbestile is a heavy-bodied plastic cement for use with asbestos flashing felts to give thorough water-tightness. As it sets, Asbestile forms an integral part of the wall itself.

Flexstone Roofs are applied only by J-M Approved Roofers. For data on Flexstone Roofs and Asbestile Flashing Systems, send for folder BU-68A. Write Johns-Manville, Box 158, Dept. PE, New York 16. In Canada, 199 Bay St., Toronto 1, Ontario.

JOHNS-MANVILLE JM PRODUCTS

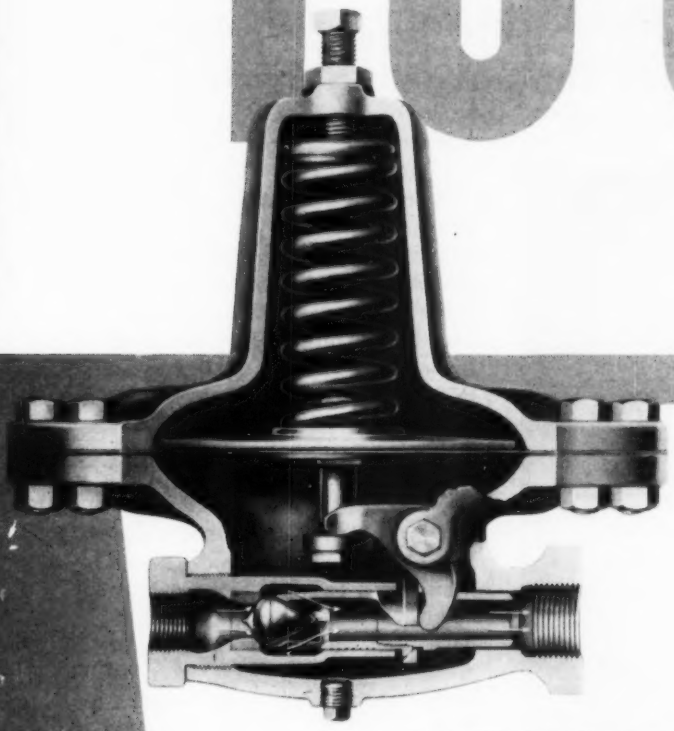
*Reg. U. S. Pat. Off.

## Johns-Manville *FLEXSTONE** Built-Up Roofs

ASBESTOS CORRUGATED TRANSITE* • ACOUSTICAL CEILINGS DECORATIVE FLOORS • MOVABLE WALLS • ETC.

**For more facts circle 507 on Reply Card**

# TYPE 1000 VALVE



Any product of quality should be dependable when *ordinary* products fail. Sudden pressure fluctuations, dirt, scale and viscous matter prove "fatal" to ordinary pressure reducing valves.

The CASH STANDARD TYPE 1000 VALVE however, is designed to operate with complete dependability under the most difficult and unusual circumstances. Many of these units have been in service over 10 years and have never been taken "out of the line."

Truly an *EXTRAORDINARY* achievement of quality and design excellence.

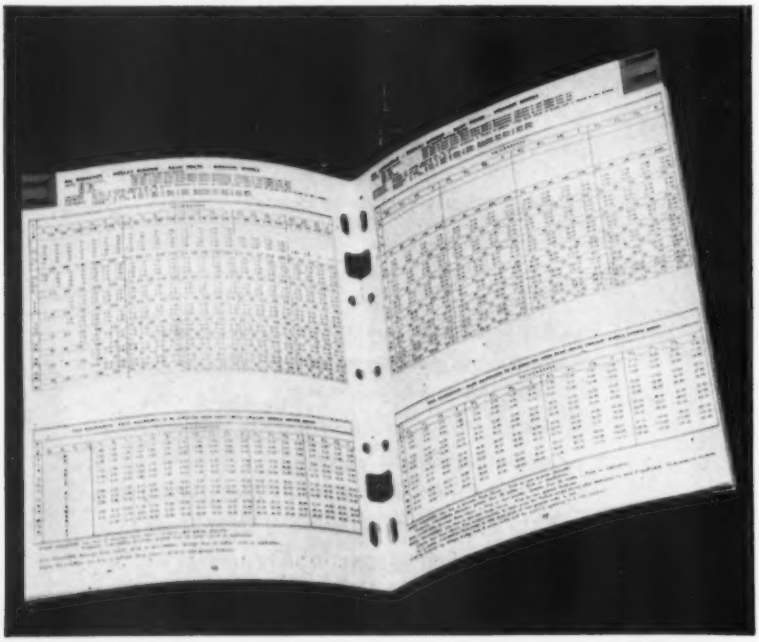
**INSTALL CASH STANDARD "TYPE 1000" VALVES**

**CASH STANDARD** **DECATUR, ILLINOIS**

**A. W. CASH COMPANY**

# FIRST SIMPLIFIED PRICING IN GRINDING WHEEL HISTORY

## CARBORUNDUM's New "Quick-Finding" Reference Replaces Traditional Complex Time-Wasting System



### 114 Page Pricing System Now Simplified to 32 Pages

CARBORUNDUM has achieved *simplification* with this new basic pricing system: previous information requiring 114 pages covering list prices, discounts, etc., has been reduced to only 32 pages.

You can now order your grinding wheels from CARBORUNDUM with a speed and accuracy hitherto impossible. Practically everything you want to know about prices, ordering quantities, discounts on any one wheel will be found on one page—arranged for quick, easy finding.

CARBORUNDUM® has taken the mystery out of buying industrial grinding wheels...by adopting the first really simplified basic price system in the history of the industry. Now you can determine prices, ordering quantities and discounts for a given wheel, almost without exception, by checking a single page of this new book.

You no longer have to refer to several pages to determine prices and discounts, nor follow complicated rules, nor apply chain discounts, nor worry about decimal multipliers. Even the special price additions covering various shapes have been eliminated. Basic prices are shown for all straight wheels *and* special wheels such as dishes, saucers, flaring cups, special faces, cones, plugs, and many others.

Practically all the wheels you use can be priced with a single discount under this new system, thus further simplifying your paper work and minimizing errors.

Coincidental with the adoption of this basic pricing system, some price adjustments have been made. Prices of certain lines of wheels are reduced, others are slightly higher.

# "A Boon to Every Customer and To Us," is Distributor Concensus

First copies of this new pricing system off the press went to several hundred Industrial Distributors of CARBORUNDUM's grinding wheel lines. The many letters of response have been highly enthusiastic. Here are typical comments:

"This is, without a doubt, the finest simplified pricing system I have ever seen. We want to compliment you on this progressive step."

"Heartiest congratulations—the new net pricing schedules are swell! It would do your heart good to see the gratitude with which these prices were received by the boys in our organization. I feel that you men who devoted so much time to getting out this pricing structure should know how we feel. This is a real contribution to Industrial Distributors—and to industrial purchasing agents."

"Next to standardization of gradings, your new price book is probably the most progressive step that has been taken in simplifying the marketing of abrasives. With this new basic pricing plan practically all the complications have been removed. We know it will have enthusiastic reception."

"Carborundum has taken a forward step that should pay off in the future. After trying a few examples in pricing, it looks as though price clerks and purchasing people will have a much easier time arriving at net prices than heretofore."

*The success of this new simplified pricing plan was foreordained, because twelve of the nation's top industrial supply men helped put the system together. This group, known as* CARBORUNDUM's *Distributor Advisory Board, was of material assistance to* CARBORUNDUM's *sales management on this key project.*

# HOW IT SAVES TIME...Cuts Errors

Reducing the number of pricing pages from 114 to 32 gives you only part of the picture of how CARBORUNDUM's new system speeds and simplifies the pricing of grinding wheels. It actually cuts down the number of steps required to compute a price—and best of all, it concentrates those steps within the confines of a single page.

As an example, consider the steps—and separate page references—previously required to find the price of cup wheels: 1) Look up the page showing the list price... 2) Look up the page showing list price additions... 3) Look up the page showing the standard ordering quantity schedule, to determine quantity for discounting purposes ... 4) Look up the page showing product discount... 5) Look up the page showing quantity discount.

All this information, previously appearing in five different places in the price schedule, is now found on a single ready-reference page. No wonder pricing now takes far less time, with far fewer chances for error.

For when you have to flip pages back and forth, sometimes losing your place, often doing involved calculations, not only do you waste valuable time, but errors are bound to creep in—errors that are even more costly than the high cost of lost time. This new simplified "all-on-one-page" system was designed to be error-proof; thorough tests by grinding wheel users prove that it actually promotes a high degree of accuracy—thus makes doubly valuable the savings in time it gives you.

## Simplified Pricing to be Extended to Other Abrasive Lines

The new basic pricing system will soon be applied to additional abrasive lines by CARBORUNDUM. Segments, Disc Wheels, Mounted Wheels and Points, "MX" Wheels, and other bonded products will shortly be covered by new simplified basic price lists.

**THE CARBORUNDUM COMPANY**

REGISTERED TRADE MARK

**Your copy is waiting for you...**

**MAIL COUPON NOW...TODAY!**

THE CARBORUNDUM COMPANY, Dept. PE 81-317
Niagara Falls, New York

Please send me my copy of "New Simplified Basic Prices of Grinding Wheels."

NAME

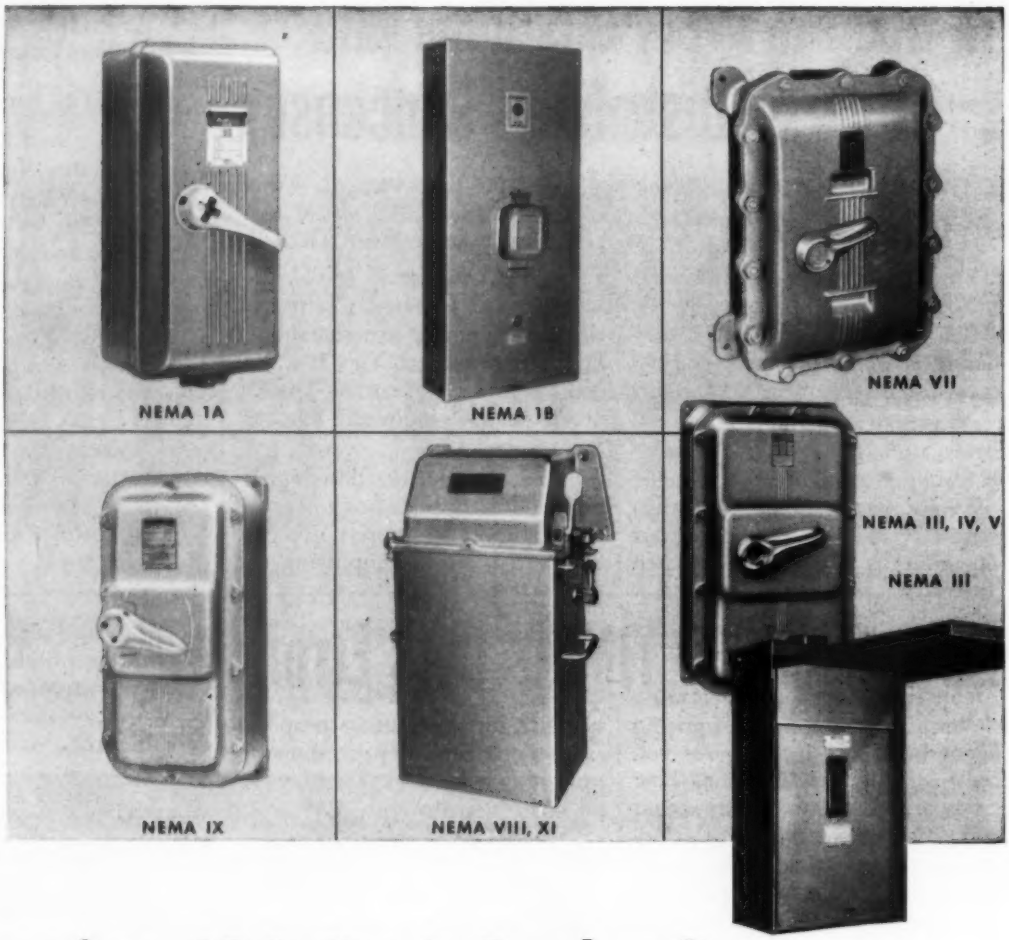
COMPANY

STREET AND NUMBER

CITY ZONE STATE

81-317

**For more facts circle 509 on Reply Card**




# This complete AB-I Circuit Breaker line

## solves all your application problems

Here's how to wrap up every circuit protection problem in your plant—with the complete line of enclosed Westinghouse AB-I Circuit Breakers.

As shown above, there's an AB-I Breaker for *every* operating condition—indoors and outdoors, in wet and dusty locations, in explosive or corrosive vapors and dusts. It's a simple matter to select the right NEMA enclosure for any application. Ends shopping around for "specials"—saves you time and money.

AB-I's relieve you of many worries. They reduce downtime as much as 98%* compared with fused devices—eliminate the hazards of fuse bridging, too. They save on maintenance—no replacement parts needed. They end unnecessary power outages with inverse-time-delay tripping action. And they protect workmen from live parts and costly accidents.

For more information on how AB-I Circuit Breakers can help you, call your Westinghouse Representative or write for B-5456, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-30142-A

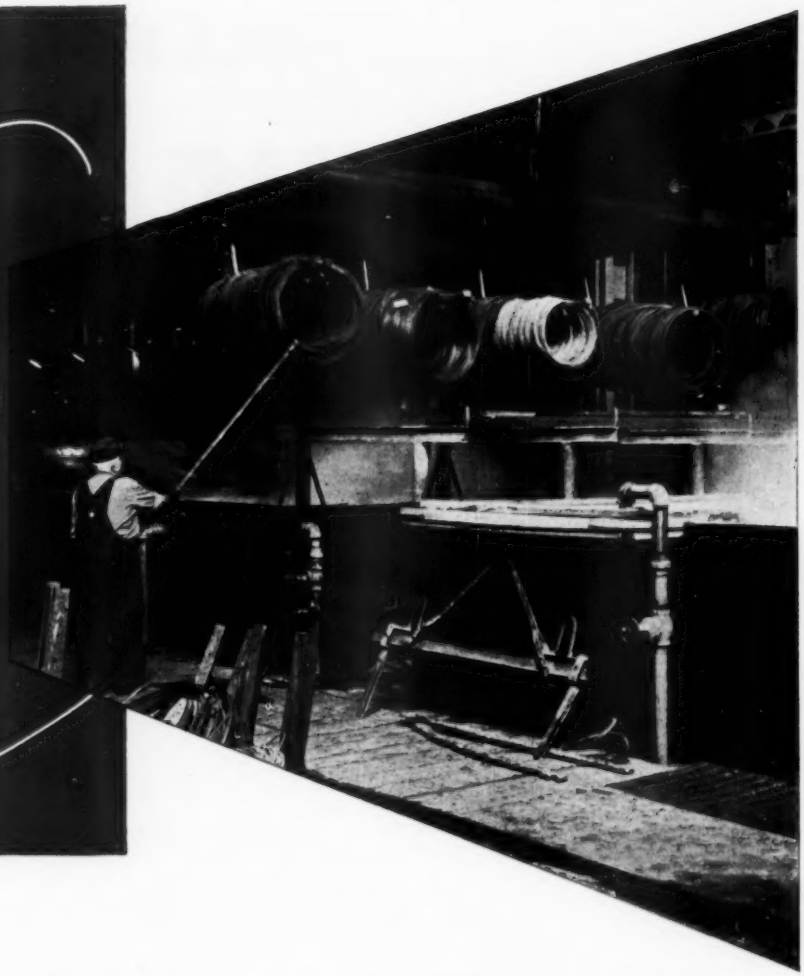
*Name of company on request*

YOU CAN BE SURE... IF IT'S

Westinghouse

For more facts circle 510 on Reply Card

# Do You Have a Corrosion Problem as Tough as This?



If you have a tough corrosion problem, there's a good chance you'll find the solution in durable Pitt Chem Tar Base Coatings.

Pickling tank surfaces like these, for example, *really* take a beating from constant exposures to acid spillage, fumes, and condensation. But month in and month out, Pitt Chem Tar Base Coatings can provide economical, long-lasting protection against these and similar extreme corrosive conditions.

Pitt Chem Tar Base Coatings are easy to apply and up to ten times as thick as ordinary paints. No other material does such a complete job of protection at so little cost.

Why not drop us a line, *right now,* outlining your problem? We'll gladly provide you with our recommendations . . . or supply the technical literature or assistance you need.

W&D 4485

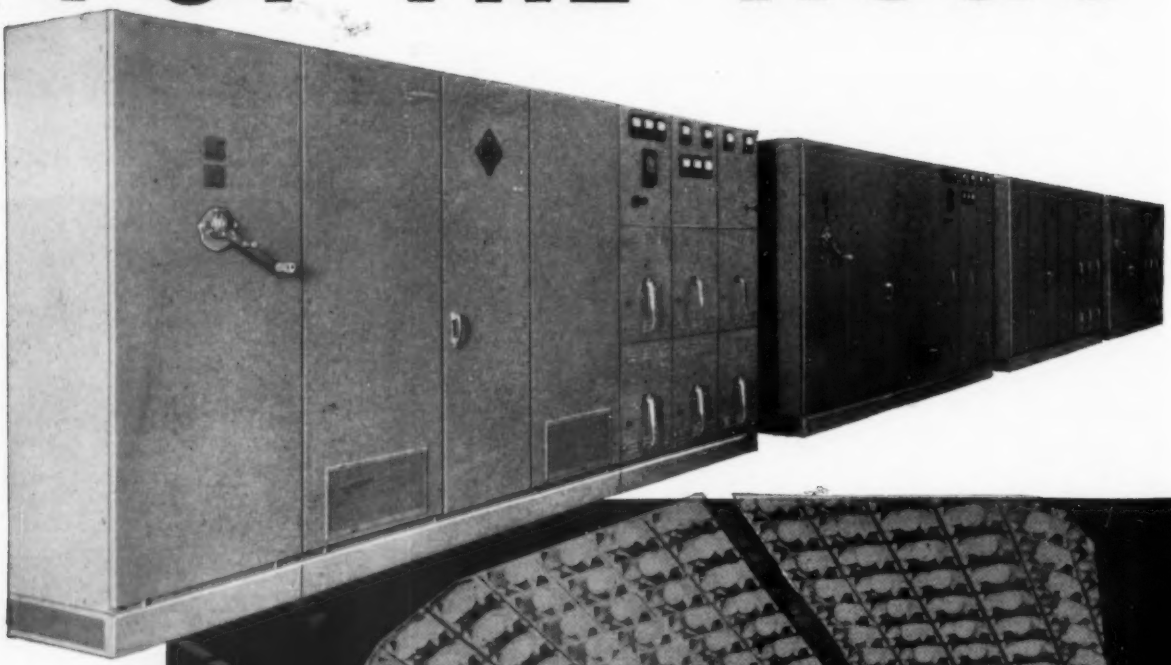
PITT CHEM 101—For Severest Conditions
PITT CHEM 102—Maintenance Coating
PITT CHEM 103—General Purpose Coating
PITT CHEM 104—Potable Water Service
PITT CHEM 105 AQUATAR—A Water Dispersion
PITT CHEM 106 TARMASTIC—Sealing Compound
PITT CHEM 107 PACHKOTE—Specialty Coating
PITT CHEM 110—Specialty Coating

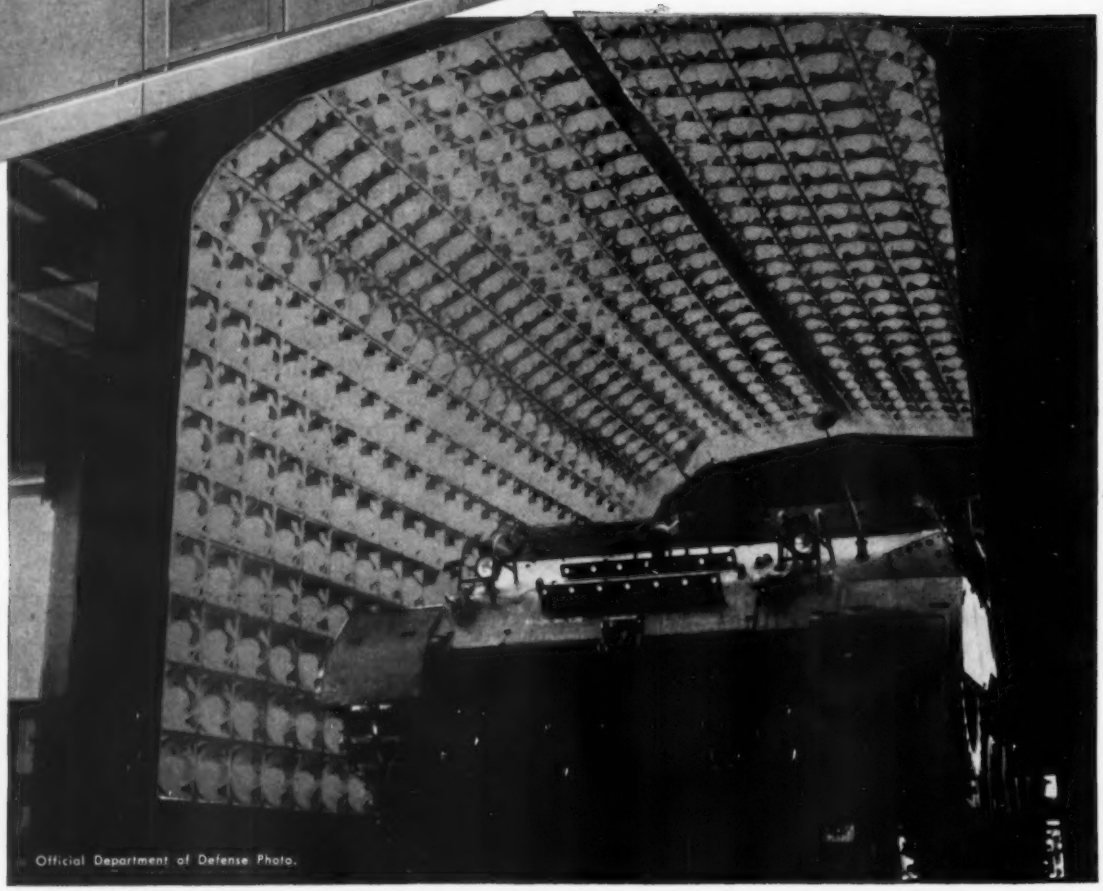
PROTECTIVE COATINGS DIVISION
PITTSBURGH
COKE & CHEMICAL CO.
Grant Building, Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

For more facts circle 511 on Reply Card

# ALLIS-CHALMERS PUT THE "Heat"





Official Department of Defense Photo.

# UNIT SUBSTATIONS

# ON PRODUCTION!

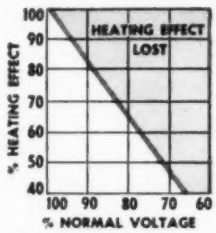
YOU CAN INCREASE the production of your plant without adding production equipment or hiring more help . . . just eliminate undervoltage. Motors, lights, heating units—all electrical equipment gives top performance only when operated at full voltage.

Paint baking or drying operations take longer when voltage drops. For example, a 10% drop reduces heating effect of infra-red lamps 19% . . . slows production. One paint drying operation required 63% more time when voltage dropped 10%.

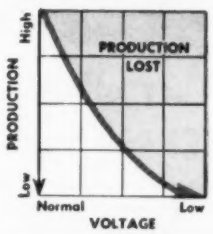
A major cause of undervoltage is long, heavily loaded 480 volt feeders. Install Allis-Chalmers LCS Unit Substations at load centers and eliminate excessive line drop by shortening low voltage cables. Performance of all electrical equipment will improve . . . and personnel efficiency will increase because of better illumination from existing lighting fixtures.

You can count on the cooperation of experienced Allis-Chalmers substation engineers in working out your distribution system. Allis-Chalmers LCS Load Center Unit Substations are neat, compact, easy to install and provide protection to personnel. Get in touch with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3372

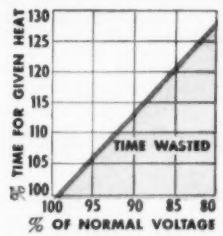
## HOW UNDERVOLTAGE WASTES MANHOURS . . . CUTS PRODUCTION



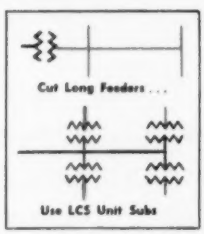

**FULL OUTPUT** from existing equipment demands full voltage. Heat output of infra-red lamps (used for baking paint on metal, drying coils of electrical apparatus and similar applications) drops with undervoltage. Output of resistance furnaces also drops off as the square of undervoltage.




**PRODUCTION LOSSES RESULT** from undervoltage. In one case a 10% drop in voltage cut the output of an infra-red drying oven from 1500 pounds per hour to 1275. Undervoltage means less work done each day . . . greater overhead for the work done, more manhours to be figured into every job.




**TIME IS WASTED** when undervoltage is distributed to infra-red bulbs and other heating devices. It takes longer to deliver the same amount of heat . . . longer to do a given job. In one plant, drying time for black painted sheet steel increased from 11 to 18 minutes by a 10% drop in voltage.



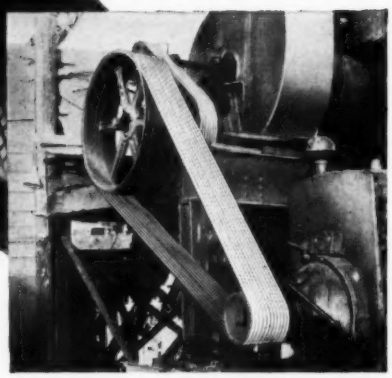

**A MAJOR CAUSE OF UNDERVOLTAGE** is voltage drop in secondary feeders. Long low voltage lines may prove inadequate as production schedules are stepped-up and new machines added. Install substations at load centers to cut feeder length, reduce voltage drop and increase production.

# ALLIS-CHALMERS

For more facts circle 512 on Reply Card

# Notice the CONCAVE SIDES (U.S. PATENT NO. 1813698) of the Gates V-Belt-

## . . . that's why Gates V-Belts Last Longer!



Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

## Look at this!

**In *half a minute* you can prove for yourself the belt-saving advantage of the CONCAVE SIDES.**

Take any *straight-sided* V-Belt (Fig. 1) and bend it as it bends in going around its pulley. At the same time, grip its sides with your fingers and *feel* those sides *bulge out* as in Fig. 1-A.

Clearly, those bulging sides will press *unevenly* against the V-pulley—and this causes extra wear at the points shown by the arrows (Fig 1-A).

### Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

As the belt bends, grip its sides—and you will feel the precisely engineered CONCAVE SIDES *fill out* to an *exact fit* in the sheave groove (Fig. 2-A).

These sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the full width of the Gates Vulco Rope—and this means *longer* belt life and *lower* belt costs for you!

**When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES— The Gates Vulco Rope.**

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

CS-537

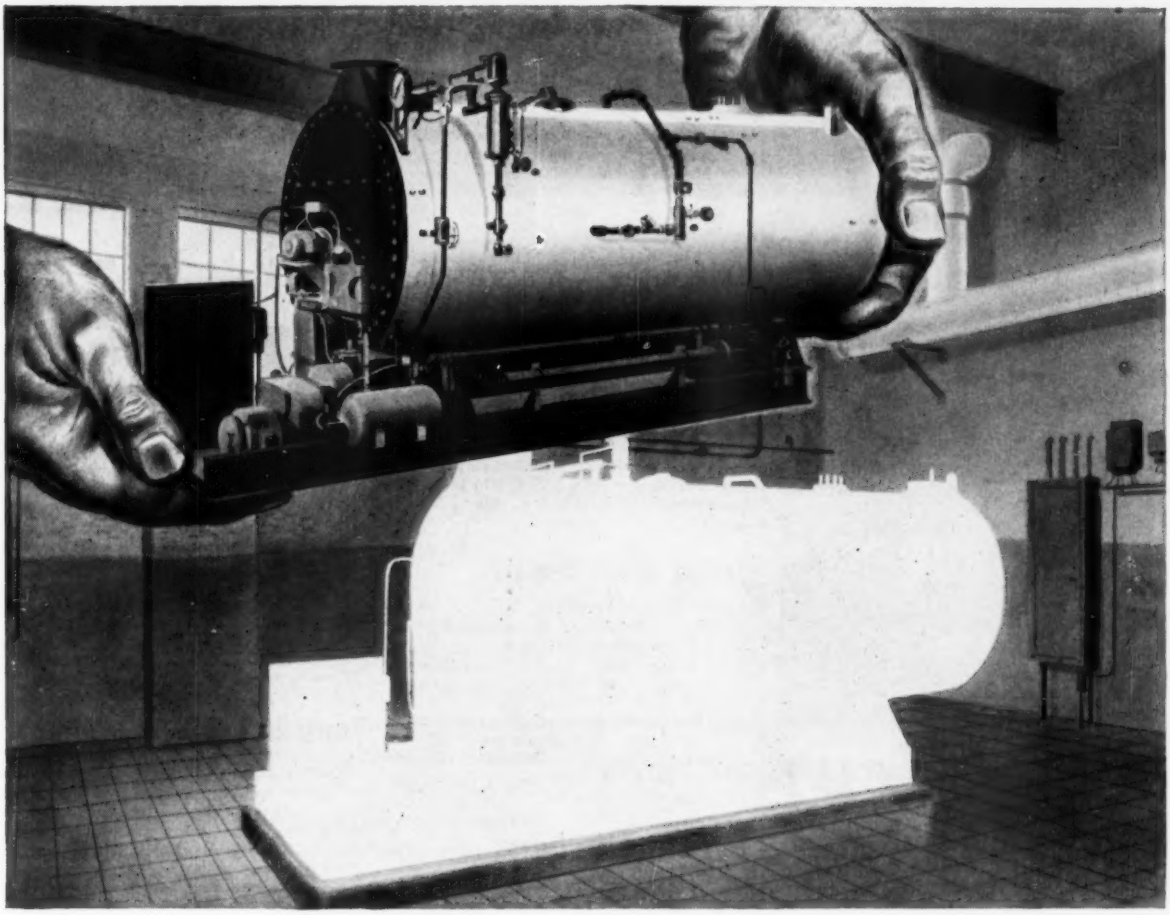
**V-Belts — Hose Molded Rubber Goods for industry World's Largest Maker of V-Belts**

Gates® VULCO ROPE DRIVES

THE GATES RUBBER COMPANY • DENVER, U.S.A.

**For more facts circle 513 on Reply Card**

# Here's why you get more...when you buy a Cleaver-Brooks Self-Contained Boiler



## ...only Cleaver-Brooks can offer you the experience gained from more than 20 years of pioneering . . . and more than 12,000 individual "packaged" boiler installations

CLEAVER-BROOKS pioneering has been largely responsible for simplifying boiler buying . . . lowering costs of installation . . . delivering 80% guaranteed steam efficiency from every fuel dollar.

Boilers can be shipped as completely assembled and tested self-contained units, with auxiliaries as required. Installation involves minimum of time, construction and space. Usually connections only to steam, fuel, water lines and electrical service are needed. No special foundations are required. A short vent takes care of exhaust gases. Frequently, boilers are ready for use in a matter of *hours*, depending on availability of service lines.

Cleaver-Brooks, originators of the self-contained boiler, offers wider experience that counts in another important way. Qualified engineers help you plan steam plants tailored *exactly* for your needs. Carefully analyzed are loads, space and equipment arrangement. This not only helps you solve present steam needs, but adds flexibility for future expansion as well.

This application engineering, plus basically sound design and construction is your assurance of a full return from your boiler investment. When you specify a self-contained boiler — make sure it's a Cleaver-Brooks.

*Send for Catalog AD-100 for full details on Cleaver-Brooks boilers. Available for oil, gas and combination oil/gas firing. Sizes 15 to 500 hp, 15 to 250 psi — for heating and processing.*

**CLEAVER-BROOKS COMPANY**

Dept. H, 307 E. Keefe Ave.
Milwaukee 12, Wisconsin, U.S.A.

**Cleaver-Brooks**

**ORIGINATORS OF THE SELF-CONTAINED BOILER**

Steam Boilers • Oil and Bitumin Tank Car Heaters • Distillation Equipment Oil and Gas Fired Conversion Burners

**For more facts circle 514 on Reply Card**

PRICES CUT
on Ramset
FASTENING SYSTEM
Tru-Set Fasteners

Now, you can cut costs still more, by using RAMSET SYSTEM for powder-fastening into steel and concrete. List prices for Tru-Set light-duty studs and drive pins cut up to 20% in this new move to increase the value of RAMSET SYSTEM for its users.

**Most versatile line of powder-actuated fastenings**

With 56 sizes in 5 types, Tru-Set Fasteners have always offered the widest selection. Now, with these low prices and with the many advantages of the Super-Speed JOBMASTER tool, you can still further cut costs with RAMSET SYSTEM.

Ask your RAMSET Dealer for details of new prices and for demonstration of speed, ease, utility and economy of RAMSET JOBMASTER.

Ramset Fasteners, INC.
Ramset Division, Olin Industries, Inc.
12121 BEREA ROAD • CLEVELAND 11, OHIO
For more facts circle 515 on Reply Card

# BACKTALK about our past issues

*Edited by R. L. Marinello*

## Reprints of Article on Pullers

PLANT ENGINEERING:

"Your April issue had an excellent article on the 'Selection, Use and Care of Tools.' This article began on page 112 and had as the subject, pullers.

"Inasmuch as we now are manufacturing a complete line of pullers for industrial, as well as automotive, applications, I wonder if you would have 75 reprints of this article that we could use for training our salesmen.

"I know this is quite a number and if you can't fulfill it, I certainly would understand your problem. However, it would be very valuable to our field sales force." *Wesley Kiley, Advertising Manager, Blackhawk Manufacturing Co., Milwaukee, Wisconsin.*

**Editor's Note:** We are unable to supply the number of reprints requested. However, we are sending you what available tear sheets we have of this article, and should you wish more, you have our permission to reproduce this material locally, if you so desire.

## Testing Circuit Breakers

PLANT ENGINEERING:

"We are interested in obtaining a reprint of an article published in the May, 1953 issue, called 'Testing Over-Current Trips on Circuit Breakers,' by John G. Howell, Jr.

"This information has been requested by one of our chief engineers." *W. M. Donaldson, Manager, Indiana Ordnance Works, E. I. du Pont de Nemours and Co., Louisville, Kentucky.*

## Data on Flexible Ducts

PLANT ENGINEERING:

"In the May, 1953 issue, there is an article on 'Flexible Ducts — Just One Feature of CBS' New TV Studio.'

"We are interested in the flexible ducts and would like more information including price. Can you put us in touch with the vendors of this product?" *J. L. Killoran, Plant Engineer, Fisher Body Div., General Motors Corp., Pontiac Plant, Pontiac, Michigan.*

**Editor's Note:** These flexible ducts are made by the American Ventilating Hose Co., 15 Park Row, New York City.

## Wants More Info on Dynarc

PLANT ENGINEERING:

"I am interested in the new Dynarc process, after reading the article in the May, 1953 issue.

"Like other plants, we are continually moving equipment and find that the process of hammering holes in concrete to anchor machines can be very delaying and dusty.

"The new Dynarc process might speed up operations for us, and I would like very much to have information on this process." *W. E. Summerhill, Equipment Engineer, The National Screw and Manufacturing Co., Cleveland 4, Ohio.*

**Editor's Note:** This equipment is manufactured by Eutectic Welding Alloys Corp., ChemoTec Division, Flushing, New York.

## Article to Serve as Reference

PLANT ENGINEERING:

"Please send two reprints of the article "Oil Seals—Their Function, Selection and Operation," on page 92 in the May, 1953 issue.

"This is an excellent article and I would like to have a copy for my reference file and one for the maintenance superintendent." *Robert J. Knowlton, Waltham Grinding Wheel Co., Waltham, Massachusetts.*

## Centrifugal Pump Articles

PLANT ENGINEERING:

"In the 'Backtalk' section of the April, 1953, issue, a writer asked how to obtain reprints of the articles 'Seven Ways to Prime Centrifugal Pumps,' October, 1951, and 'Centrifugal Pumps—Their Correct Operation and Maintenance,' in the April, 1952, issue.

"As we are going into the use of centrifugal pumps, our management has asked me to obtain copies of these two articles if they are available." *George Boyer, Purchasing Agent, The Hardie Manufacturing Co., Hudson, Michigan.*

## Zeprex Inquiries Still Arriving

PLANT ENGINEERING:

"Never in the experience of any of us who have been associated with the development of United States Plywood Corp. has any product of ours evoked such spontaneous interest as Zeprex. We have been swamped and a large part of the swamping is due to the heavy returns from the article appearing in PLANT ENGINEERING.

"Naturally, we did get a little behind in handling all the inquiries from your readers because we like to write each person, but we are pretty well up to date at the moment." *James J. Dunne, Vice President, United States Plywood Corp., New York.*

PLANT ENGINEERING:

"I saw your article on Zeprex in the April issue and would like more information about the material.

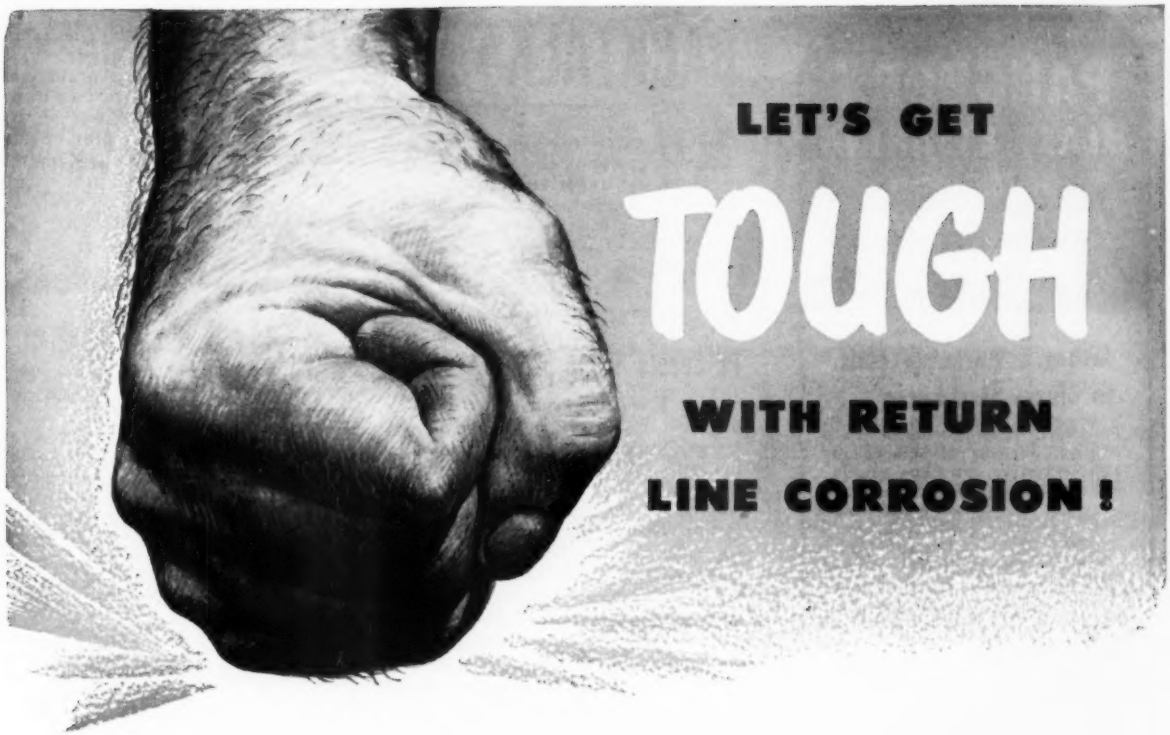
"I have been contemplating building a combination residence structure, garage and shop, and Zeprex sounds interesting.

"Will you kindly send me all available information regarding this product." *J. A. Early, Chief Tool Engineer, Sundstrand Machine Tool Co., Rockford, Illinois.*

PLANT ENGINEERING:

"We have read with a great deal of interest your article on the material called Zeprex.

"As manufacturers of porcelain enamel we are very much interested in the development of a sandwich




Any way you figure it, corrosion of steam and condensate lines is a serious problem . . . and a costly one! Replacement of corroded lines, interrupted production, increased labor and maintenance send costs spiraling far beyond the limits of economical plant operation. But something can be done about it *right now*, with complete assurance of satisfactory results.

Take the case, for example, of a large plastics molding plant which operated the cycle on its molding machines alternately with steam and oxygen-saturated cooling water. Under these conditions, severe corrosion resulted. Check valves on the steam supply lines to the machines had an average life of only one week—*sometimes even less!* Costs were skyrocketing.

Here's what Betz did about it. By applying its patented filming amine treatment, piping and valve losses stopped *immediately!* After three years' treatment with this advanced technique, satisfactory corrosion control continues. What's more, plant records show savings in labor and maintenance have averaged 30 times the cost of the treatment applied.

This is just one example of how Betz Engineers help keep plants *like yours* at peak operating efficiency. Why not get in touch with Betz today as the first step toward solving your particular water problems. There's no obligation, of course. W. H. & L. D. BETZ, Gillingham & Worth Streets, Philadelphia 24, Pa. In Canada: Betz Laboratories Limited, Montreal 1.

*For the full facts and figures on how BETZ is solving return line corrosion problems in plants like yours, write today for Technical Paper No. 124.*

BETZ

CONSULTANTS ON ALL WATER PROBLEMS

For more facts circle 516 on Reply Card

**PANGBORN**
**BLAST CLEANING**
*GIVES YOU FASTER, CHEAPER MAINTENANCE*

**Either a Portable Unit to Clean Structures...**

*Pangborn Blast Cleaning Machine*—Cleans tanks, bridges, buildings, and other structures quickly and economically. Ideal for maintenance and other jobs, such as removal of dirt, scale, rust, etc. preparatory to painting. Six sizes, stationary or portable, from . . . **$188** and up.

**Or a Compact Cabinet for Small Pieces**

*Pangborn Blast Cabinet*—Saves time and money in cleaning small metal parts . . . removing rust, scale, grime, old paint, etc. Produces smooth, clean surfaces on pieces up to 60" x 35" in size. Models from . . . **$319** and up.

***Pangborn Unit Dust Collectors***—Trap dust at the source. Minimize maintenance, allow reclamation of valuable material . . . **$286** and up.

***Pangborn Hydro-Finish Cabinets***—Remove directional grinding lines, hold tolerances to .0001". Reduce further finishing of tools, molds, dies . . . **$1410** and up.

Write for details on these machines to: PANGBORN CORPORATION, 3200 Pangborn Blvd., Hagerstown, Md.

*Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment*

**Pangborn**
BLAST CLEANS CHEAPER

**For more facts circle 517 on Reply Card**


# BACKTALK

panel for applications in curtain wall construction. We believe perhaps that this material might be valuable to us in such a development and would appreciate your advising us as to the manufacturer and any pertinent information you might send us." *Charles A. Calisch, Ass't General Sales Manager, Texlite, Inc., Dallas, Texas.*

## PE Covers Scope of His Work

PLANT ENGINEERING:

PLANT ENGINEERING magazine covers the scope of my work in such manner that most of the technical magazines I receive could be considered supplementary to your publication." *Elmer Holtz, Plant Engineer, Igleheart Brothers Div., General Foods Corp., Pendleton, Oregon.*

## Yearly Index

PLANT ENGINEERING:

"We are attempting to bring articles in back issues of PLANT ENGINEERING to the attention of more of our personnel and find that an index would be invaluable.

"We would like to know whether you publish a yearly index, and if so, how we may obtain a copy." *Foster J. Braun, Plant Superintendent, Froedtert Grain and Malting Co., Inc., Milwaukee, Wisconsin.*

**Editor's Note:** A yearly index is published in the December issue. However, if other readers prefer an extra copy for their personal file, just indicate this on one of the inquiry cards in this issue.

## Request to Reprint Plant Engineering Course

PLANT ENGINEERING:

"The article on pages 76 and 77 of the March, 1953 issue is splendid and even more comprehensive than I had a right to hope for.

"You have recognized the excellence of the Milwaukee School of Engineering program and facilities, plus the high level of its administrative personnel and its 'partners from industry.'

"May we have your permission to reprint pages 76 and 77?" *Burton E. Holtvedt, Klau-Van Pietersom-Dunlap Associates, Milwaukee, Wisconsin.*

## To Reprint Scrap Article

PLANT ENGINEERING:

"May we have your kind permission to reprint a portion of the article 'They Monitor Their Scrap,' which was published in the March, 1953 issue?

"Your publication would be credited, of course, and we would gladly see that you received file copies of *Supervisor's Memos & Quotes* in which the reprint will appear.

"If you are willing to grant your consent, might I impose further to the extent of requesting two sets of tear sheets of this feature." *Mort Friedlander, Editor, Supervisor's Memos & Quotes, Mystic, Connecticut.*

## Figuring Paint Costs

PLANT ENGINEERING:

"A copy of 'The Right Way to Figure the Cost of Painting,' page 93-94 of the April, 1953 issue came across our desk.

"We are unable to determine whether this is a reprint or a page torn from the magazine.

"If this is a reprint, we would appreciate your forwarding 200 copies, billing us for whatever the cost might be." *W. C. Rhodes, General Sales Manager, The Lowe Brothers Co., Dayton, Ohio.*

**Editor's Note:** These were definitely tear sheets since the article was not reprinted. You have our permission, however, to reprint the article.

## Materials Handling Article

PLANT ENGINEERING:

"Our client, The Ross Carrier Co., is interested in obtaining 1000 to 2500 reprint copies of the article entitled 'Study in Materials Handling—The Job That Timken Did.' This appeared in the June, 1952 issue." *Ken L. Johnson, Vice President, Paxson Advtg., Benton Harbor, Mich.*

## Pass-Along Request

PLANT ENGINEERING:

"In an exchange of correspondence I have had with U. S. Electrical Motors, Inc., a copy was requested of the article 'Preventive Maintenance Program Warns of Needed Repairs on Time,' written by myself. This appeared in the November, 1952 issue.

"If possible, I would like to have a reprint of this article to forward to the interested party. If you prefer, however, to forward a copy of the article direct, please send it to H. D. Graham, Sales Department, U. S. Electrical Motors, Inc., Los Angeles, California." *Elmer Holtz, Plant Engineer, Igleheart Brothers Division, General Foods Corp., Pendleton, Ore.*

## Article Goes to School

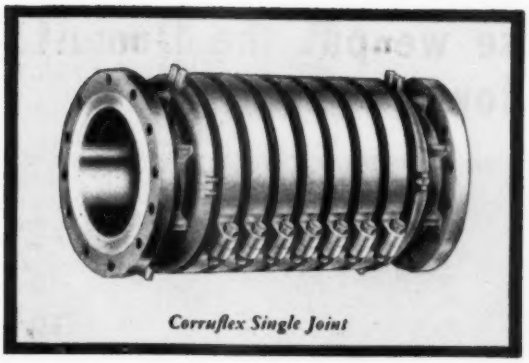
PLANT ENGINEERING:

"I give a course in Employee Communications at New York University and am always interested in relevant material.

"I was wondering whether you could send me tear sheets of the article, 'Cooperation Is Key to Success in Buffalo Suggestion Plans,' by E. Weller. *Lawrence Stessin, Assistant Professor, Department of Management and Industrial Relations, New York University, New York.*

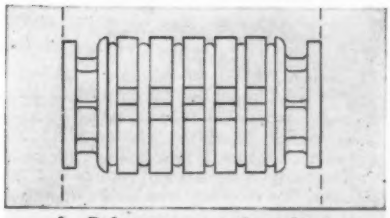
# INSTALL...

# AND THEN FORGET

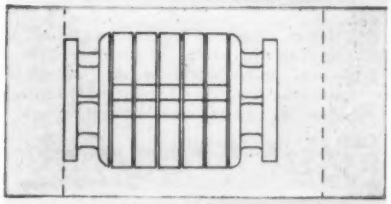


*Corruflex Single Joint*

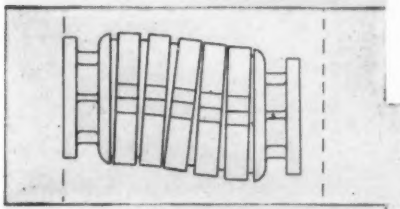
# *Corruflex* PACKLESS EXPANSION JOINTS



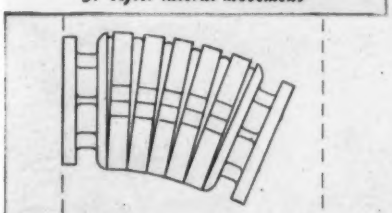
1. *Before movement of any kind*



2. *After axial movement*



3. *After lateral movement*



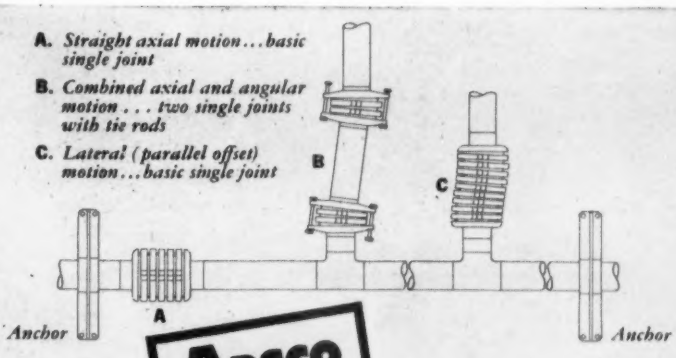
4. *After angular movement*

Why worry about maintenance in pipe lines when you don't have to? Install ADSCO Corruflex Expansion Joints... they are packless and require no maintenance. Put 'em in the line and forget 'em.

In ADSCO's *complete* Corruflex line there are many joints for many purposes: Swing, Hinge, Tie-Rod, Universal, Internally-Guided, Anti-Compression, Balanced, Gimbal, etc. But the leader of the Corruflex line... the joint from which all others are derived...is the Basic Single Joint shown on this page. Here is a dependable workhorse which will solve many pipe expansion problems. Problems *it* can't solve *can* be solved by other Corruflex Joints.

Drawings 1 & 2 at left show accordion-like movement as the Basic Single Joint opens and closes to absorb axial movement. In Drawings 3 & 4, note that maximum lateral deflection and maximum angular rotation are obtained when joint is in median position. ADSCO can supply complete tabular data on the maximum amount of allowable lateral and angular movement either side of center line. Under certain conditions, such as the addition of extra corrugations, the Basic Single Joint can be used to absorb combined axial and lateral or combined axial and angular motions.

For assistance in laying out piping systems, a cordial invitation is extended to you to consult ADSCO's engineering staff. Phone your ADSCO representative about this service or write the factory direct.


A. Straight axial motion... basic single joint
B. Combined axial and angular motion . . . two single joints with tie rods
C. Lateral (parallel offset) motion... basic single joint
B
C
A
Anchor
Anchor

ADSCO ENGINEERED PRODUCTS

EXPANSION JOINTS • HEAT EXCHANGERS • STEAM TRAPS • STRAINERS • SEPARATORS • METERS

## AMERICAN DISTRICT STEAM COMPANY, INC.

NORTH TONAWANDA, NEW YORK

*Since 1877*

**For more facts circle 518 on Reply Card**

# Suppose we put the Dempster-Dumpster System right down in your plant . . . then what?

● *Well First—let's make it clear that we are furnishing you with several sizes of different designs of 26 containers to suit your materials requirements. Then bear in mind that we are delivering you only one truck-mounted Dempster-Dumpster and with your driver this one outfit picks-up, hauls and dumps all containers, about like the one shown above.*

Now, how many conventional trucks are you using for handling rubbish, scrap, raw materials, and what have you?

For several years now, one plant has been doing considerably more work with two Dempster-Dumpsters and two men than they did with five trucks and fifteen men before the Dempster-Dumpster System was installed. You can guess at the approximate savings annually.

A glance at the picture below and you get the whole story of the Dempster-Dumpster System. Never before have you been able to cut bulk materials handling costs so drastically.

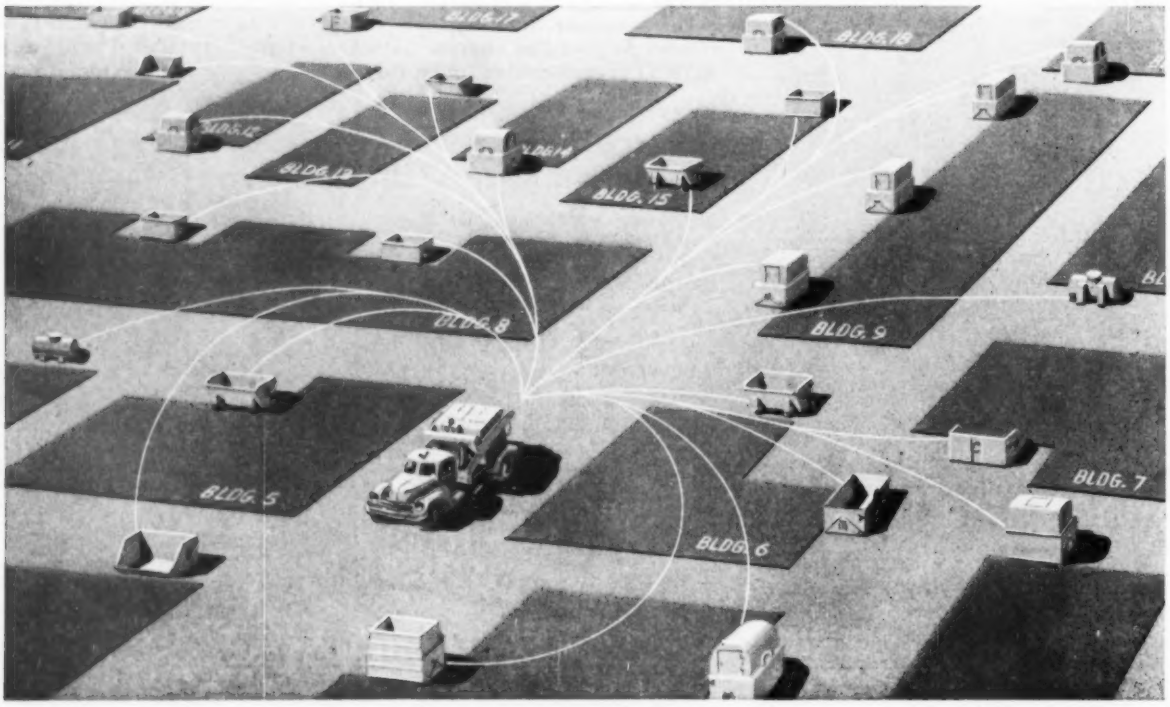
One truck mounted Dempster-Dumpster handles the entire group of 26 Dempster-Dumpster containers. These big, detachable steel containers are like having 26 truck bodies for a single truck.

Any required number of Dempster-Dumpster containers are spotted at convenient materials accumulation points inside and outside your buildings. They range in sizes up to 12 cu. yds.—3 to 4 times the capacity of a regular dump truck. Materials—bulky, light, heavy, solids, rubbish and even liquids—are dumped or placed into these containers.

The truck mounted Dempster-Dumpster makes scheduled rounds, picks up each preloaded container, carries it to the point of disposal, sets it down intact or dumps the materials and returns the container for refilling. The entire operation is hydraulically controlled and handled by your truck driver.

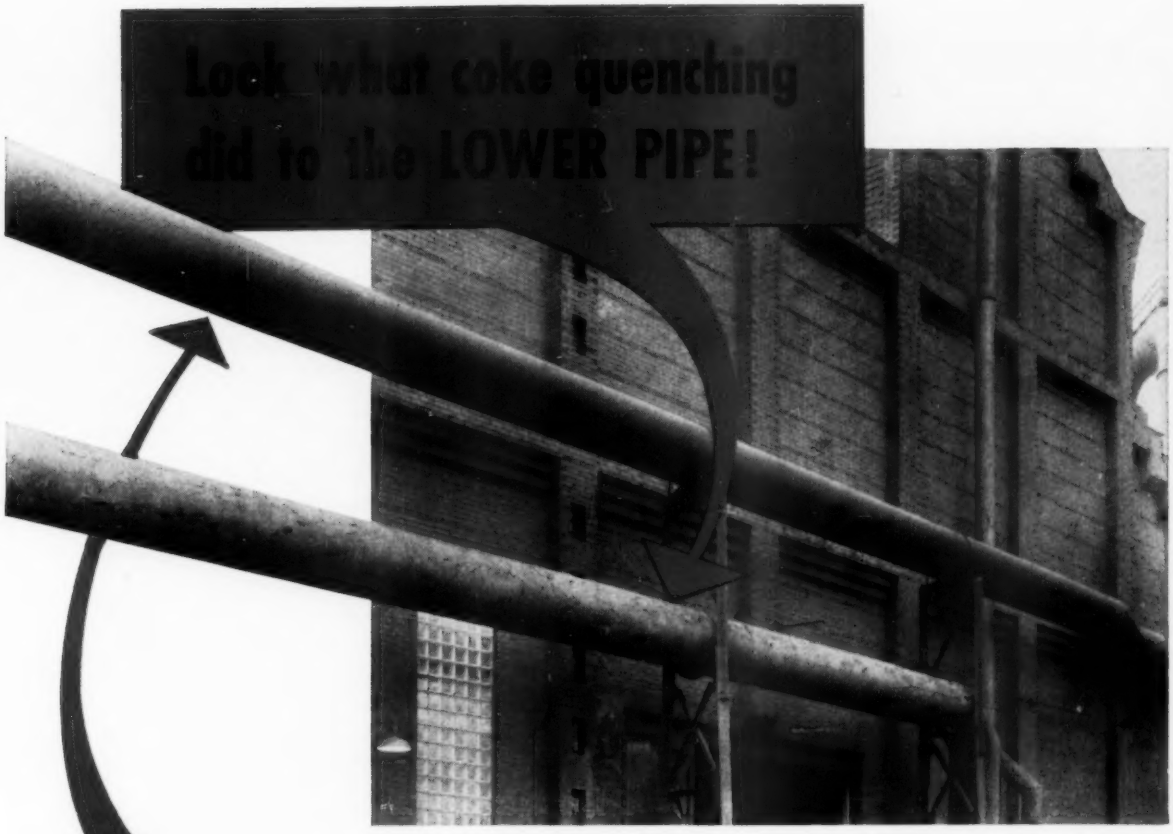
It's as simple as we have described it. The amazing thing is the tremendous savings being made by the Dempster-Dumpster System in hundreds of leading industrial plants over the nation.

A product of Dempster Brothers, Inc.




**DEMPSTER BROTHERS, 173 Shea Building, Knoxville 17, Tennessee**

For more facts circle 519 on Reply Card




# THEN LOOK AT THE UPPER PIPE *completely protected* BY INSUL-MASTIC

**The top pipe in this unretouched photograph has a three year old coating of INSUL-MASTIC, the *Superior* protective coating. The bottom pipe has been painted several times during those three years. These pipes are in a steel mill and both are constantly showered with acid vapors from a coke quenching tower which is around the corner of the building. So strong are the vapors that they sting the faces and arms of workmen, but three years of this punishment have not harmed the INSUL-MASTIC coated pipe.**

Steel mills throughout the country are learning that INSUL-MASTIC lasts for years and years and practically eliminates maintenance and replacement of metal equipment. These coatings are extremely resistant to acids, alkalis and moisture. They are specially made that way. The generous use of Gilsonite, one of nature's most chemically resistant minerals, helps give this lasting protection.

Save your tanks, structural steel, pipes, quench cars and everything on or near your coke batteries. Do as other mills are doing. Specify INSUL-MASTIC for coating this equipment.

*There is an INSUL-MASTIC representative near you. ★★★ Write for his name!*

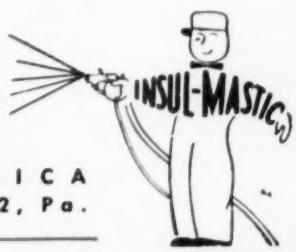
*Think First of the Coatings that last!*

*Insul-Mastic*

CORPORATION OF AMERICA

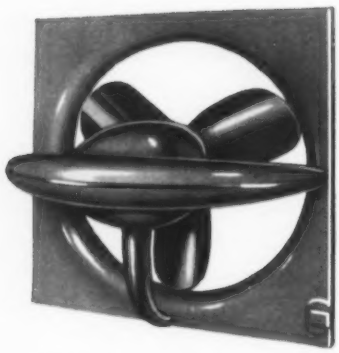
Oliver Building • Pittsburgh 22, Pa.

*Representatives in Principal Cities*




**For more facts circle 520 on Reply Card**

# American Blower *Ventura Fans*



American Blower Model A Ventura Ventilating Fan. Capacities from 1000 cfm to 9700 cfm, free delivery.

Nothing, absolutely nothing, overcomes the objections to bad odors quite as well as removing them. American Blower Ventura Fans will do this job quickly, quietly and efficiently.

Their modern, streamlined styling makes them ideal for offices, restaurants, retail stores and other commercial buildings.

Ventura Fans, Air Conditioning Units and Unit Heaters are but a part of American Blower's complete line of Air Handling equipment. Write today for information or literature on any of our products.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary Corporation

**AMERICAN BLOWER**

YOUR BEST BUY IN AIR HANDLING EQUIPMENT

*Serving home and industry:* AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS

For more facts circle 521 on Reply Card

# INSTALL WIREWAYS FASTER!

## SQUARE D's NEW AND EXCLUSIVE *Lay-in Duct*

FASTER ASSEMBLY!
LESS NUTS AND BOLTS
FASTER WIRING!
NO MORE THREADING OR PULLING OF CONDUCTORS...JUST LAY THEM IN
FASTER HANGING!
UNIVERSAL TYPE HANGERS
FASTER GANGING!
KNOCKOUTS MATCH THOSE ON RELATED SQUARE D EQUIPMENT. NO CONDUIT BENDING

Square D's exclusive design provides hinged covers for both the duct sections and connectors. Easily removable fitting covers then provide a completely unobstructed wireway in which to lay wires.

**LAY-IN DUCT** is available in 2½" x 2½", 4" x 4", and 6" x 6" sizes, in standard lengths of 1, 2, and 5 feet. There is a complete line of fittings, all with the "lay-in" design feature.

• • •

*Write* for the complete story of **LAY-IN DUCT**—how it gives you a better wireway system, easier, faster and at less cost. Address Square D Company, 6060 Rivard Street, Detroit 11, Michigan.

**ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS**

**SQUARE D COMPANY**

1903 • **50** YEARS OF DESIGN LEADERSHIP • 1953

# PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

*Edited by E. B. Skubik*

## Palletless Drum Handling Pays Dividends

How DOES one go about quadrupling production and handling in the same space? This was the challenge confronting the General Petroleum Corp. of California. It was called upon to supply 30,000 long tons of paving asphalt in 90 days.

In preparing to deliver the giant order, officials realized that ordinary filling and handling methods would be inadequate due to the time restriction involved.

The handling details were worked out by Trans-Harbor Co. of Long Beach, Calif. Its method proceeds on the principle of confining all phenomena of desired and undesired results into one compact area of processing, using a minimum of labor and a specially designed mechanical system.

The consulting company has introduced a multiple fixed filling outlet mounted over a production line of steel roller conveyors. This arrangement permits the complete and continuous processing of containers in units of four. Getting to and from the production line is accomplished with lift truck which uses a comparatively new overhead friction-grab multiple drum carrying tool.

The method that was introduced

**Truck moves four drums of hot molten asphalt with help of handy device shown**

enables management to eliminate multiple processing of the individual drum. It confines the operating area to 25 per cent of previous requirements, amplifies given operating area by this ability to quadruple-deck the package and cuts labor crew by 50 per cent.

Perhaps the greatest achievement of this lift truck-grab combination is the ability to lift directly from the production line without the slightest damage to the thin and pliable 24 gal steel drums. The 300 deg molten asphalt is in liquid form offering no solidified support to the fragile drum, and is an obvious strain to the seams of the drum. Now, no longer is the "cooling period" an accepted waste cost.

This method of utilizing the best in modern materials handling equipment is responsible for obtaining a continuous flow of asphalt from production to shipping that can average 500 tons or 2,000 drums per day in the same space and time that formerly handled only 500 drums. *From Space, published by Hyster Company, Portland, Oregon.*

## Concave Tank End Insulation

SECURING INSULATION to concave ends of heated horizontal tanks is not a simple matter of banding as with convex ends and cylindrical tank surfaces. Each section of mineral wool block insulation on a concave surface must be individually held in position.

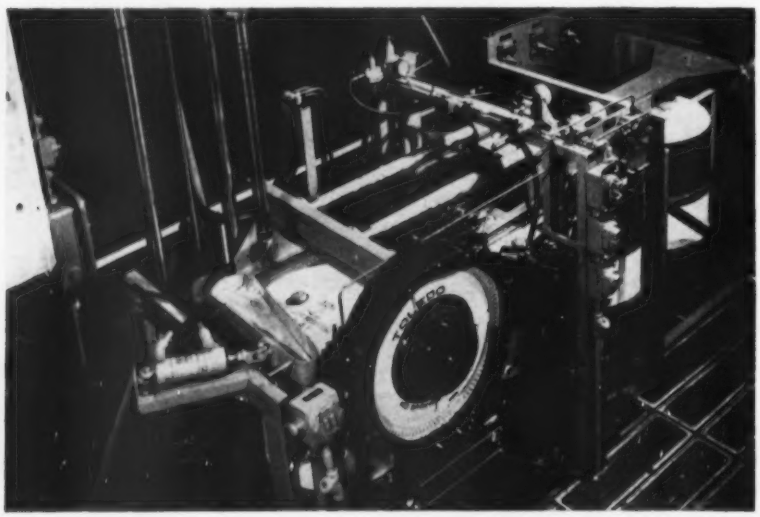
An effective method of attachment on concave tank ends employs nuts welded to the surface as anchors for tie wires passing from nut to nut over each section of insulation.

The alternative removable-head construction is useful on tanks where the concave ends cannot be welded or where periodic internal inspection of the tank is simplified by easy removal and replacement of the insulation.

Welded edgewise to the metal surface, ¼ in. nuts are spaced between

## This Barrel-Filler "Thinks" for Itself, Compensates for Variations in Barrels

THE WORLD'S only completely automatic barrel-filler which operates with almost super-human efficiency, is employed at the Richmond plant of the Standard Oil Company of California. Designed by Rufus Ranney, Al Guerard and Donald Reese, refinery engineers, the machine does its job of filling barrels with oil better and faster than ever.



**World's only completely automatic barrel-filler compensates for all variations in barrels, which leave machine ready for capping and dispatching to customer**

The problem of designing this machine was not simple, since the 55 gal oil barrels come in many different types. Their weight varies up to six or seven pounds; their heights vary; and nearly every barrel has its bung-hole in a slightly different position. The new machine, however, automatically compensates for all of these variations, locates the bung hole under the filler lance and starts the oil flow. The scale in the machine controls the flow of oil and shuts it off at exactly the right moment. The barrel leaves the machine ready to be capped and sent to the customer. It can fill 1000 barrels in eight hours.

The Standard Oil Company of California has already licensed one machinery manufacturer to make the barrel filler which will become available to the entire industry. *From The Standard Oiler, published by the Standard Oil Company of California, San Francisco.*

# WHY 2 OF DENVER'S 5 REFINERIES SELECTED NICHOLSON STEAM TRAPS

*may be important to you*

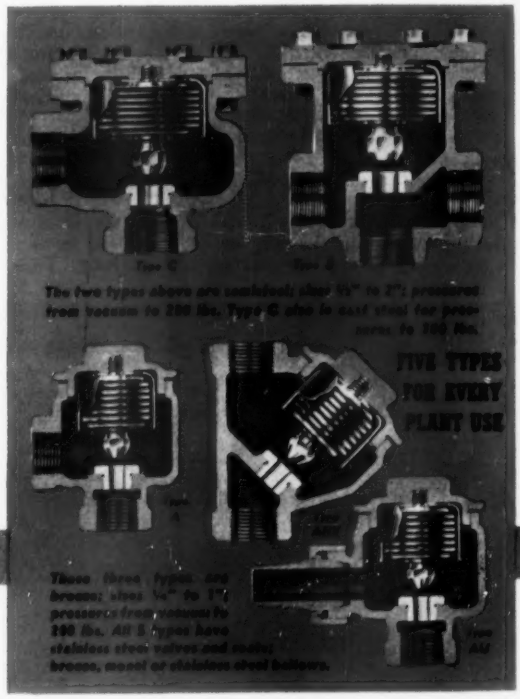
LIKE many industrial plants, the two operations referred to above had been using a considerable number of different kinds of steam traps. Both refineries have standardized on Nicholson traps, for practically all applications, for these basic reasons: Nicholson traps were found to be the most effective in improving heat transfer and in promoting production efficiency. These are advantages which, we believe, are of interest and importance to plant men in every industry.

A recent survey showed these Nicholson features to be reasons why an increasing number of leading plants are standardizing on Nicholson thermostatic traps:

1) Two to six times average drainage capacity; shorten heat-up time.
2) Operate at lower temperature differential; fast action keeps equipment full of live steam; higher and more even temperatures.
3) No air binding; eliminate costly fluctuation of operating temperatures.
4) Freeze-proof; drain completely when cold; can be freely installed outdoors.
5) Only one moving part; minimum maintenance.
6) No need to change valves for varying operating pressures from vacuum to maximum allowable.
7) Record low for steam waste; as little as 1%.

Types for every process, power and heat application.

*Send for*
**CATALOG 751**
Contains installation diagrams and data for determining proper size of trap.




**W. H. NICHOLSON & CO.**

**TRAPS · VALVES · FLOATS**

208 OREGON ST., WILKES-BARRE, PA.

*Sales and Engineering Offices in 58 Principal Cities*

**For more facts circle 523 on Reply Card**

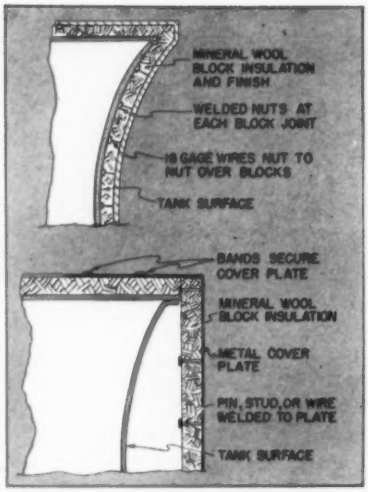
# PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

each horizontal row of block insulation so that at least two vertical rows of nuts cross each insulating section. For example, application of 6 by 18 in. mineral wool block insulation requires welded nuts at 6 in. vertical intervals and not less than 9 in. horizontal intervals. The 18 gage tie wires are passed through the nuts and tightened over each section of insulation as it is placed in position.

The final step is the application of appropriate finishing materials such as mineral wool insulating and finishing cements, followed by a waterproof coating as specified. The same installation steps apply to the use of welded rods and studs as well as to nuts.

The removable head is constructed by first attaching mineral wool blocks to a metal cover plate of the proper diameter. The insulating blocks are impaled on pins, studs or wires welded to the cover plate at


MINERAL WOOL BLOCK INSULATION AND FINISH
WELDED NUTS AT EACH BLOCK JOINT
18 GAGE WIRES NUT TO NUT OVER BLOCKS
TANK SURFACE
BANDS SECURE COVER PLATE
MINERAL WOOL BLOCK INSULATION
METAL COVER PLATE
PIN, STUD, OR WIRE WELDED TO PLATE
TANK SURFACE

**Welded nuts and wire are used in the direct surface application at the top. A removable insulation head is used in alternate method shown at bottom**

regular intervals. Special clips are placed over the pins and studs or the welded wires are bent over to hold the insulation tightly in place.

Sheet metal is cut and welded onto the cover plate to form its cylindrical sides. The cover plate is fitted over the end and held by bands around the tank. The additional cost of the removable head over surface application is partly offset because there is no need for finishing the insulation. *From a release for Industrial Mineral Fiber Institute, New York, N. Y.*

## High Frequency Vibrations Make Machining Jobs Easier

DIES as simple as an ordinary house key or as complex as a watch assembly, can now be cut, drilled, embossed or otherwise machined by a tool that induces vibrations at the rate of 1,620,000 times a minute.

The process developed by the Cavitron Equipment Corporation, uses a tool or pattern, shaped in any contour, that works into the piece to be machined, while a mixture of boron carbide and water flows around the end of it. Under slight pressure, the tool gradually sinks into the workpiece as the abrasive chips away minute flakes.

The speed of the operation depends upon the size and type of material to be machined. With glass, tungsten carbide, hardened steels or semi-precious stones, intricate

(Continued on page 32)

## Convenient "Long Tube Method" Tests Efficiency of Acoustic Materials in the Field

LABORATORY SAMPLES of acoustic plasters constructed under controlled conditions usually yield repeatable test results. However, when the same materials are installed for use, the sound-absorbing properties depend to a large degree on such factors as the care devoted to the mixing of ingredients, the skill of the plasterer and the conditions under which the plaster is cured. Poor choice of redecorating materials may also result in loss or diminution of its sound absorbing properties.

The "long tube method" for measuring the effectiveness of newly installed or redecorated acoustic materials, recently developed by Earle Jones, Seymour Edelman and Albert London of the National Bureau of Standards sound laboratory, will help obviate these difficulties.

The method determines the sound-absorption coefficient of materials without defacing them. Field measurements of the installed acoustic materials will not only give a check on compliance with specifications but will also permit examination of a small portion of the material before and after redecorating.

The tube used for testing the materials is constructed of ⅛ in. brass, 9¾ in. in diam, and is about 30 in. long. This is long enough to allow at least two minima and one maximum to be found, but not too long for easy handling. It is pivoted so that it can be used at any angle between vertical and horizontal. The pivot supports, on a jackscrew, permit the tube to be moved vertically about one foot, while the entire instrument moves about easily on casters. The sound source is a 6-in. permanent-magnet speaker mounted on a ⅛-in. brass plate covering the back of the tube. The signal from an oscillator drives the loudspeaker. The limits of this particular tube restrict its use to frequencies near 500 cps only.

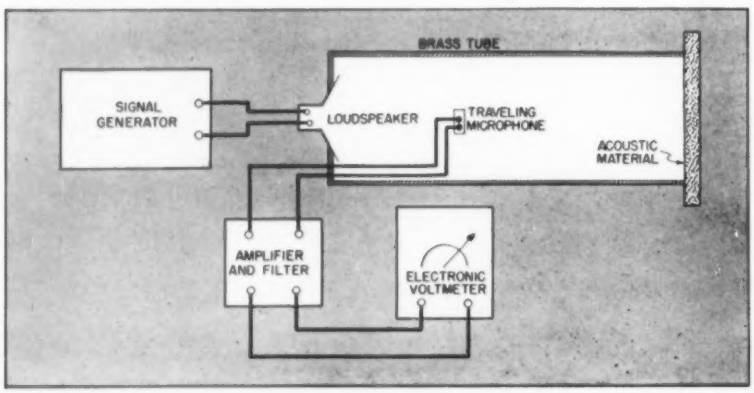



**Diagram of tube and equipment for measuring sound-absorption co-efficients**

The sound absorption qualities of finished acoustic plaster are greatly affected by details of workmanship, such as the pressure of the trowel, the time of trowelling after application, consistency of the mix and the texture imparted to the surface. Thus it was found in a series of tests that the absorption coefficient varies from point to point by considerable amounts and that this difference in absorption coefficient is closely correlated with differences in the appearances of the materials. Therefore measurements should be taken in as many locations as possible.

Acoustic tile appears to be more uniform than plaster and fewer measurements are necessary. *From the Technical News Bulletin, published by National Bureau of Standards, Washington, D. C.*

# ...with TYCOL lubricants on hand!

**Heavy-duty cutting operations?** Here's what happens when you switch to Tycol Afton oils! A well known Engineering Company (you'd recognize the name instantly) recently tested cutting oils used to shape 14" gears on a Gleason Bevel Gear Generator. Their findings: after the first rough cut around, with competitive oils, they had to grind a full ⅛" off the cutter. With Tycol Afton 8, they hobbed *two* gears and took off only .013". Afton oils are non-corrosive . . . and so stable they're widely recommended as hydraulic oils! They serve a triple function as coolants, lubricants, and hydraulic media on the same machine . . . the heavier the cut – the better they perform. It will pay you to find out why – by contacting your local Tide Water office!

TYCOL
INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C. • Pittsburgh
Philadelphia • Chicago • Detroit
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Toronto, Canada

***Over 300 Tycol industrial lubricants are at your disposal . . . engineered to fit the job!***

**REFINERS AND MARKETERS OF VEEDOL . . . THE WORLD'S MOST FAMOUS MOTOR OIL**

TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE · NEW YORK 4, N.Y.

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# How Tight? Drop Tight!

**This True Ball Joint Makes the Difference**

Spherically ground Dart seats say "no" to leaks as long as in service — and as often as piping is changed. Darts can be taken off the line and used elsewhere time and time again. That's economy! What's more, the tight seal comes easily without heavy wrenching or strain.

*QUICK FACTS*

- Two bronze seats provide top resistance to pitting and corrosion
- Heavy shoulders can withstand the strongest yanks of the wrench
- Nut and body of air-refined, high test malleable iron are practically indestructible
- Threads are full and clean-cut of hard metal to prevent stripping

Experience proves that the men who *buy* Darts, the men who *use* Darts and the men who *sell* Darts have "something special"!

**DART UNION COMPANY**
**Providence 5, Rhode Island**
*The Fairbanks Co. — Distributors*
Boston•New York•Pittsburgh•Rome, Ga.

**DART UNIONS**

**For more facts circle 525 on Reply Card**


# PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

**Tool is readily brazed to holder. Other tools rest in rack on top of bench**

shapes can be embossed or cut in a matter of minutes, while it may take several hours for deep cavities.

The interchanging of the tools or patterns is a simple process. The tool is brazed to a Monel cone or toolholder and then screwed to a transducer assembly. The cone transmits the high frequency vibrations to the workpiece.

The process involves very low stress and no local heating in the machining area and, as result, no thermal cracking or pitting takes place on the material machined.

While experimentation may be required to adapt the process to new applications, the machine now makes it possible to produce dies of carbides and other exceptionally hard materials in solid, one-piece form and in complex shapes.

It is expected that as further development takes place and new experience is gained, greater efficiences will be achieved in many industries. *From Inco Magazine, published by the International Nickel Co., Inc., New York N. Y.*

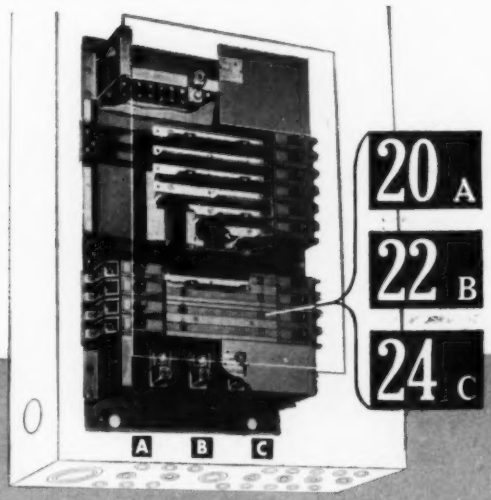
## Remote Water Level Indicator

ONE COMPANY had the problem of obtaining water level readings at a point 1,000 ft from a tank that was about 30 ft high. An inexpensive solution, one not requiring a lot of apparatus on the inside, was sought.

An instrument engineer, E. E. Stockwell reported how this was done. A good sized main extended from the side of the tank. This was not in use but was shut off just above the ground. A modulating pressure sensing unit was tapped into this main. A matching control motor drives through a portion of a revolution in response to the variations in the pressure unit.

There still remained the job of transmitting the readings the required distance. This was done by

(Continued on page 38)




*Circuit breaker panelboards, of course, but...*

# Westinghouse permanent phase identification saves installation and maintenance time

Westinghouse Panelboards provide modern, labor-saving control of lighting and appliance branch circuit power distribution, electrically and mechanically.

For instance, no guesswork is required to determine the connections between branch circuits and main bus on standard 3-phase, 4-wire lighting Panelboards. Each circuit and the bus to which it is connected is clearly, permanently identified. Eliminates time-consuming ringing-out of circuits. Simplifies installation, wiring or rewiring for future circuit changes.

For the quality that delivers power effectively, cuts outage time, speeds installation and maintenance, look to Westinghouse Factory Assembled Panelboards.

More facts? Call your Westinghouse Distributor, or write for DB-30-930, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania.

J-93476

YOU CAN BE SURE...IF IT'S Westinghouse

"DE-ION" BREAKER PANELBOARDS

APPARATUS DISTRIBUTOR WESTINGHOUSE

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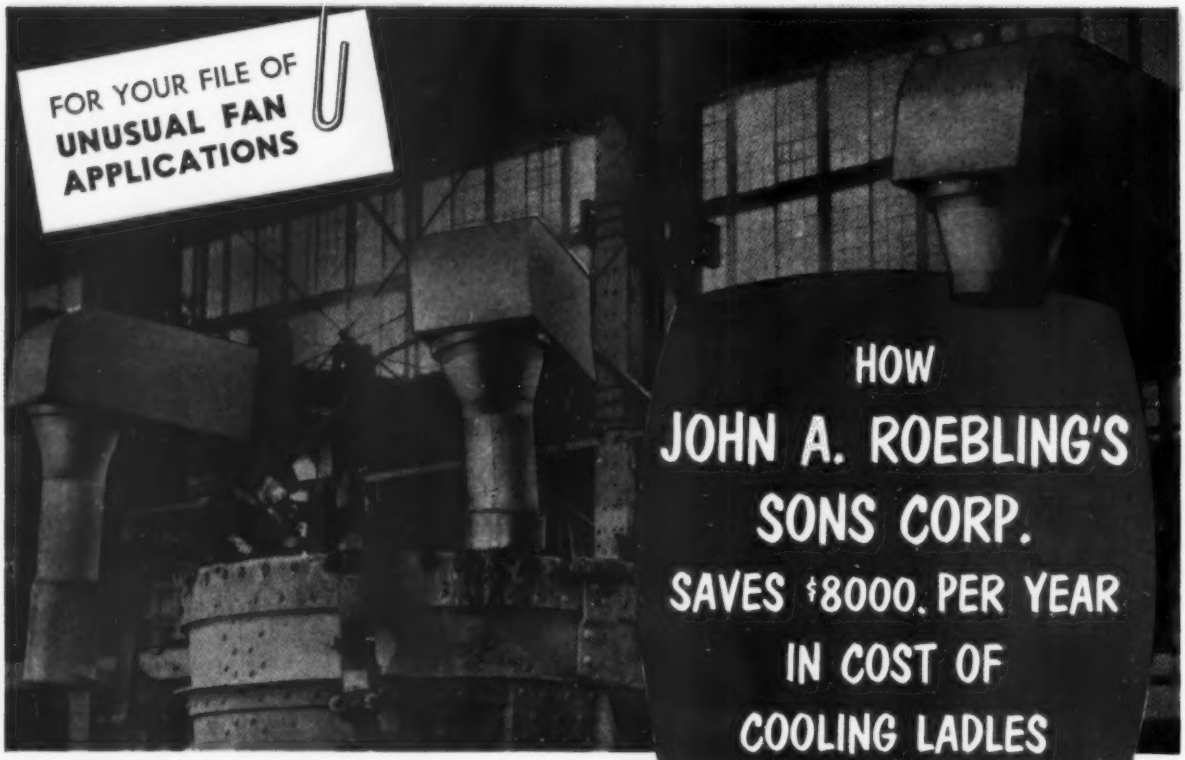


FOR YOUR FILE OF
**UNUSUAL FAN APPLICATIONS**

# HOW JOHN A. ROEBLING'S SONS CORP. SAVES $8000. PER YEAR IN COST OF COOLING LADLES

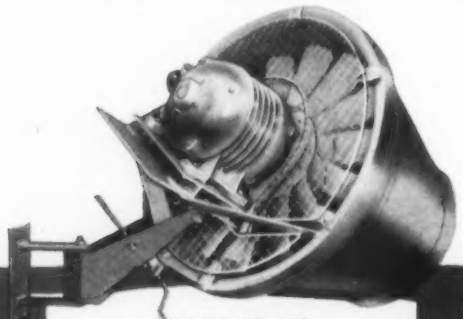
At the Roebling, New Jersey, mill of John A. Roebling's Sons Corporation, seventeen 45-ton ladles are kept busy in the production of carbon steel, from which the famous Roebling wire rope is made. After each heat, ladles must be cooled down from 2000° F and pouring nozzles installed.

Dissatisfied with the old method of using compressed air for cooling ladles, engineers at Roebling's conceived the idea of trying a DeBothezat "Hy-V" Air Jet to do the job. They selected a "Hy-V" Air Jet with 21" fan wheel and 1½ HP motor which produces 5600 CFM at a nozzle velocity of 4570 FPM, and it worked so well that Roebling has installed four more. Each is mounted on a swinging bracket and is equipped with special nozzle extension so that air is discharged near the bottom of the ladle. Nozzle extension is retractable.

Here's what E. M. Yard, Roebling Combustion Engineer, has to say about the installation: *"Nearly the full capacity of one 200 HP air compressor was previously used to do this job. The use of "Hy-V" Air Jets means a power saving of probably $8,000.00 per year. In addition, the installation of these fan units, at a total cost of about $4,000.00 eliminated the need for additional air compressor capacity which would have cost $16,000.00. These fan units will recover their cost in about six months from power savings alone."*

Whether it's a question of cooling people or equipment, "Hy-V" Air Jets do the job efficiently and inexpensively. For detailed information, ask your DeBothezat representative or write our factory, Dept. HV653, for catalog PE-753.

Certified Ratings
PFMA



**"HY-V" AIR JET**
is a 14-blade axial-flow pressure fan which projects a high velocity stream of air as far as 65 feet. Built with fan wheels 18" through 30" in diameter, with nozzle velocities up to 5780 FPM.

# DeBothezat Fans

Division of American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

For more facts circle 527 on Reply Card

# BULLETINS just released and of immediate plant interest

## ELECTRICAL

**101 Motor Standards Compared**—Eight-pp Bulletin GEA-5095, giving information on the new NEMA motor standards, compares the old and new frame assignments for open-type poly-phase, single-phase and wound-rotor motors as well as totally-enclosed fan-coo'ed types. Also lists suggested new frame assignments for foot-mounted and flange-mounted motors and standards for minimum locked-rotor torque for general purpose single-phase motors. General Electric Co.

**102 Motor Starters**—These two new bulletins cover specifications and applications of company's line of manual and magnetic motor starters. Bulletin 404, on manual motor controls, lists special design features of the line, including double-break silver contacts and mounting flexibility. Twelve-pp Bulletin 504 describes design features and uses of magnetic motor starters available in remote control, local control and selector switch control forms. Federal Electric Products Co.

**103 Weather Protected Motors**—Bulletin GEA-5810 describes weather-protected motors of 250 hp and larger. Explains construction features of the base-ventilated and grade-mounted designs. Ventilation systems are diagrammed, and a table based on hp and desired rpm is included. General Electric Co.

**104 Specialty Transformers**—Booklet B-5800, 16 pp, discusses specialty transformers. Opening section describes standard models, giving details of transformer characteristics and construction for general purpose, machine tool, signaling, control and other types. A second section covers transformers that can be built for basic components to fit specific requirements. A final section presents testing techniques and a discussion of core developments. Westinghouse Electric Corp.

**105 Electrical Connectors**—Twelve-pp Bulletin 3-4-1 covers manufacturer's Williamsgrip electrical connectors, giving details of their operation, performance, applications and dimensions. Booklet is well illustrated with photos, schematics and graphs. AiResearch Mfg. Co.

**The Reader Service Card nearby needs no postage. Just circle item numbers of all bulletins wanted. Be sure to include your name, your job title and company name.**

**106 Flexible Conduit**—Bulletin UA-530 describes "Sealtite" liquid-tight electrical wiring conduit announced as UL approved for use in wet locations. Discusses ease of installation, provides specifications, suggested applications. American Metal Hose Branch, The American Brass Co.

**107 Underground Cable**—Bulletin 100 gives data on company's Parause Type RR cable for use in ducts or direct earth installation. Describes construction and gives some installation examples, stressing their economy for underground use. Paranite Wire & Cable Div., Essex Wire Corp.

**108 Protective Relaying**—Booklet GET-1768A, 72 pp, is a new and expanded edition of "The Art of Protective Relaying," explaining the broad principles of modern practice in the protective relaying of power apparatus. Contains information on types of relays for protecting generators, transformers, transmission lines. Outlines procedures used in evaluating power apparatus and system characteristics to determine proper application and settings of relays. Also lists available relays with references to detailed literature. General Electric Co.

## MECHANICAL POWER TRANSMISSION

**109 Variable Speed Motors**—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls etc. U. S. Electrical Motors Inc.

**110 Gearmotors**—The function, design and application of gearmotors are described in Bulletin GEA-1437H, 16 pp. Presents standard types of company's Tri-Clad gearmotors with ratings from 1/6 to 200 hp. Cutaway photos show relative position of parts which are distinctive to the design of each motor. Adaptability to low-speed jobs and adjustable-speed drives are explained along with gearmotor maintenance. Electrical types and characteristics as well as special mechanical features are given. General Electric Co.

**112 Bearing Calculator**—This calculator is offered to aid in the selection of ball thrust bearings. Its circular sliding scale provides a simple means of converting bearing capacities (load, speed, life) required for a given application into terms of rated bearing capacities. It selects the proper bearing size for the application under consideration without pencil calculations. Reverse side shows company's line. Aetna Ball and Roller Bearing Co.

## INSTRUMENTS, CONTROLS

**113 Care of Control Equipment**—Eight-pp Bulletin 14X7612A, "Proper Maintenance Control," tells what to look for in maintaining electrical control devices. Besides giving helpful suggestions toward overcoming the most frequent difficulties booklet provides a control trouble-shooting chart for quick reference showing the symptom, possible cause and cure. Lists 26 suggested maintenance checking points. Allis-Chalmers Mfg. Co.

**114 Metering and Control Equipment**—Sixteen-pp Bulletin 16 is a comprehensive catalog offering information on company's line of meters, control equipment and engineering services. It is written for engineers in power plants, public utilities and process plants. Fifteen measured variables common to power and process operations form the index for selecting appropriate metering and control equipment. Basic specifications and literature references included. Bailey Meter Co.

**115 Electronic Humidity Control**—Instrumentation Data Sheet 10.5-4a describes a new concept of humidity measurement that makes possible direct humidity readings from remote locations. Discusses its application in industrial air conditioning systems. Industrial Div., Minneapolis-Honeywell Regulator Co.

July, 1953

Card valid after 6 months.

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Use this space to ask for tear sheets, other information wanted.

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**116** **Improved Tachometer**—Bulletin 781 announces a new five-range hand tachometer with improved slip coupling overspeed device. Explains operating principle, advantages. Illustrated with photos, gives data on range combinations. Herman H. Sticht Co., Inc.

**117** **Electronic Feedwater Control**—Three systems for the electronic regulation of boiler feedwater are explained briefly and diagrammed in Bulletin 52-1073-221. They include a single-element, two-element, and three-element system. Applications for each type are told, and descriptions of the flow measuring, receiving, level measuring elements, power unit and valve are included. The Hays Corp.

**118** **For Automatic Door Operation**—This 16-pp catalog, Form M-14, covers use of company's Magic Door controls in automatic door operation. Describes push button, pull cord, floor switch, Magic Carpet, hardware and photo-electric controls. Applications include entrance doors, service doors and many industrial installations. Magic Door Div., The Stanley Works.

## VALVES, PIPING AND ACCESSORIES

**119** **Lubricated Plug Valves**—Form 189, is a 32-pp comprehensive catalog describing company's new line of lubricated plug valves of steel and semi-steel construction, for working pressures from 175 to 800 psi. Design details and dimensions are included. A section of the book is devoted to such accessories as remote control devices, wrenches, locking devices, adaptors. Also provided is information on lubricating and servicing, a compilation of service pressure-temperature ratings and flange drilling templates. The Ohio Injector Co.

**120** **Pipe, Pipe Fabrication**—Specifications for pipe from ⅛- to 24-in. dia are provided in 16-pp Catalog 575 C. Tables show wall thickness and weight covering Schedule 20 through 160 pipe, also standard, extra strong and double extra heavy pipe, spiralweld pipe, large OD pipe, line pipe, tubing, welding fittings and flanges and well casings. API specifications are listed for casings and oil country tubular goods. L. B. Foster Co.

**121** **Duplex Strainers**—Bulletin 200, 8 pp, describes and pictures company's Duplo duplex strainers for clearing liquids of objectionable solids and for use on either suction or pressure lines having a continuous flow. Various types of these double-basket strainers are presented, along with information on strainer baskets. Capacity data and pressure drop tables are provided. Sheffler-Gross Co.

**122** **Duct Insulation**—This new 16-pp design data booklet on Fiberglas duct insulations contains more than 40 photos and drawings of rigid and flexible insulations for the exterior and interior of warm and cold air ducts. Includes information about a new flexible duct liner which may be installed on metal sheets before they are bent to form ducts. It is Neoprene coated to prevent erosion and reduce frictional loss. Owens-Corning Fiberglas Corp.

**123** **Gilsulate Insulation**—A practical and economical method of insulating hot buried pipes and protecting them against corrosion is described in this illustrated bulletin. Explains advantages of Gilsulate insulation, stresses ease of application. Includes brief technical data. American Gilsonite Co.

**124** **Flexible Metal Hose**—Fifty-pp Catalog 200 is a well-organized, generously illustrated book on company's Titeflex helically-wound flexible metal hose and Unitlex helically-corrugated flexible metal hose. Besides providing descriptive data and specifications on the hose, fittings and assemblies, gives ordering instructions covering these items as well as metal conduit and ferrules, bendable pipe, high- and low-frequency leads etc. An engineering data section provides charts showing frictional losses versus flow rates, illustrated tips on installation, maintenance. Titeflex, Inc.

## PUMPS, PUMPING

**125** **End Suction Pump**—Bulletin WQ-214 introduces company's new Type DF, an end-suction centrifugal pump with capacities to 1000 gpm and heads to 400 ft. Double-row thrust bearings, deep stuffing boxes and other design features are shown in cutaway illustration. Gives dimensions, specifications for these pumps, lists a wide range fluids they are suited to handle. Warren Steam Pump Co., Inc.

**126** **Ceramic Plungers**—Bulletin W-404-B5 lists chemical and physical properties of the plungers and describes the process by which they are manufactured. Discusses corrosion- and abrasion-resistance and high strength properties of these plungers for reciprocating pumps. Includes a section on installation procedures. Worthington Corp.

**127** **Screw Pumps**—Bulletin SH-5, 6 pp, presents external gear and bearing, bracket-type screw pumps for pumping non-lubricating fluids, semi-fluids. Explains applications and advantages of the pumps and provides large sectional illustration showing construction features. Includes dimensions and specifications. Sier-Bath Gear and Pump Co., Inc.

## MATERIALS HANDLING

**128** **Materials Handling System**—Catalog 53 is a 12-pp booklet showing different units in company's Work-O-Matic system. On-the-job photos show material positioning with bin boxes and gravity-fed hoppers, and tiering, storing and dumping with multi-duty boxes and trays. Picture stories tell how end-loading scoops and multi-duty trays go further in integrating production, storage, material movement and disposal than previously thought possible. Union Metal Mfg. Co.

**129** **Package Handling Conveyors**—Bulletin 400, 16 pp, covers company's complete line of package handling conveyors—power belt conveyors, both portable and fixed, roller and wheel gravity units and units with extensible boom. Fully illustrated, includes specifications, dimensions, application suggestions. Also presents conveyor accessories. A. B. Farquhar Div., The Oliver Corp.

**130** **Way to Cut Handling Costs**—This 8-pp brochure covers use of wire Cargotainers and pallets in cutting handling costs, and shows specific uses in a wide variety of industries. Case histories are presented to show cost-saving advantages, and complete technical information on both Clearview and Stripbase models is provided. Pittsburgh Steel Products Co.

**131** **Belt Conveyor Carriers**—Carriers designed for rugged jobs, exposure to dust and long service are the subject of illustrated Bulletin 463. Shows how their spun end rolls and welded steel frame contribute to extra strength and better balance. Gives dimensions, specifications of standard three-roller styles. Stephens-Adamson Mfg. Co.

**132** **Logistics of Boxes**—This 8-pp booklet stresses the handling of boxes in load units, treating as "boxes" rectangular

(Continued on page 157)

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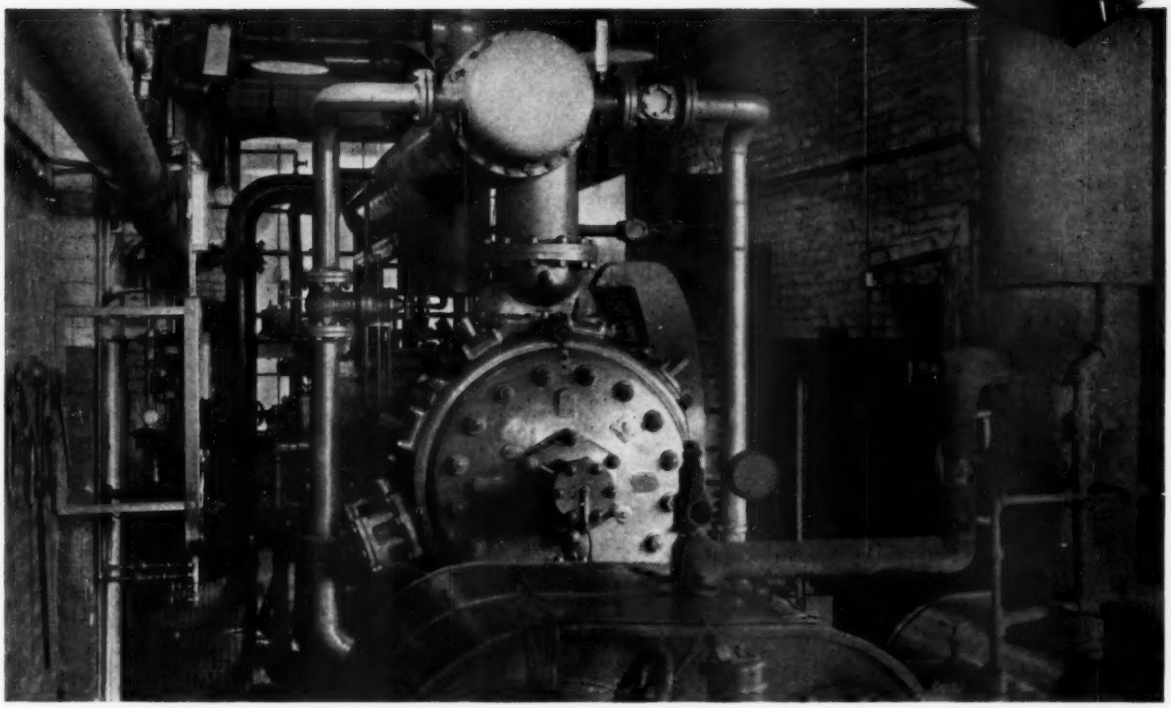
# Is available floor space holding back expansion of your plant air facilities?



Haven't got the floor space for additional plant air facilities? Don't be too sure!

How about the nooks and crannies, or right in among your machine tools? Other plants are squeezing Clark Balanced/Opposed Compressors in many such "impossible" places. The above illustration, in an aluminum forging plant, is a typical example. Here a 600 hp, 3200 cfm Clark unit was squeezed into a 20 x 13 ft. floor area.

It's a fact that a Clark Balanced/Opposed Compressor can be moved in anywhere. One of the reasons is its compactness. Another is its absolutely vibration-free performance. You can set it in a corner, on a second floor, or alongside even the most delicate of machining operations. The savings in building, piping and installation costs are considerable.

For full information on this modern, motor-driven compressor (150-4500 hp range), request Bulletin 118, or call your nearest Clark representative.

**CLARK BROS. CO. • OLEAN, N. Y.**
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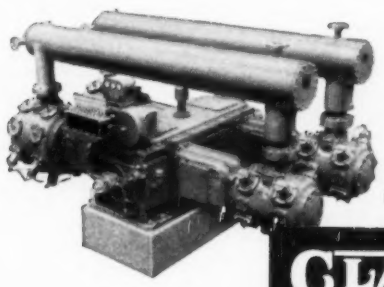

PRECISION BY THE TON . . .

**CLARK balanced/opposed compressors**

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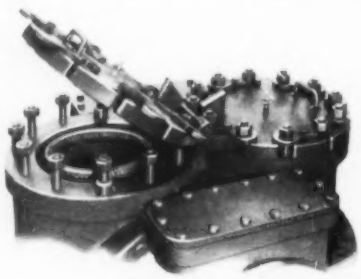
# Big baskets mean fewer clean-outs

● Each basket gives a ratio of straining area to inlet area of 5 to 1, affording a reserve capacity for arrested debris that permits of long operating periods without dumping. Even then the clean-out need not be immediate as the alternate basket will take up the straining load at the turn of a couple of valve handles. Note that the top of the basket is open, greatly facilitating dumping. When in the straining chamber, the basket drops just far enough, on a set-screw adjustment, to permit the strainer top to effectually close the basket top opening.

**DOORS ARE OF HEAVY STEEL PLATE,** crack-proof even under most unusual stress. No need to worry when turning down the holding nuts to insure uniform stress all around. The nuts are never removed from the studs as backing them off a turn or two relieves tension on the "S" shaped washers, which can then be slipped aside to permit raising of the door.

Elliott Twin Strainers are used in practically every industry where liquids are involved. Types for high and low pressure. Sizes 4 in. to 24 in. Bulletin A-13 has complete data. Ask your local Elliott representative or write Elliott Company, Jeannette, Pa.



**ELLIOTT Company**

***Accessories Dept.***

A3-1

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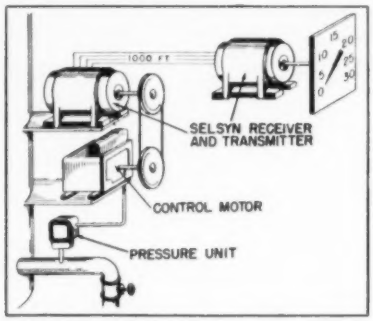
## PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

connecting a Selsyn directly to the crank of the control motor so the primary Selsyn, in effect, moved directly in response to the variation in pressure.

The matching Selsyn, connected by 4 wires, was mounted behind a panelboard 1,000 ft from the tank. A pointer was installed on its shaft. The scale over which the pointer was to travel was calibrated in feet.

When the water level changed,




**Pressure unit senses change in water level; motor moves accordingly. Selsyn transmitter picks up movement; receiver duplicates it and moves pointer**

the primary Selsyn moved its partner behind the panelboard and the pointer moved to the new level.

If a remote reading is not required, the control motor can be mounted behind a panel and a pointer can be installed on its shaft extending to the other side of the panel.

The indication is not of a high degree of accuracy but it is close enough for all intents and purposes. *From Industrial Control News, published by Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.*

### Chemical Thermometers Work En Route

FOOD EXPERTS KNOW that temperatures only as high as 100F can damage the appearance, handling and baking qualities of a pastry mix, so definite information was needed by General Mills physicists about the peak temperatures encountered at various places inside the boxcars in which the mix was shipped.

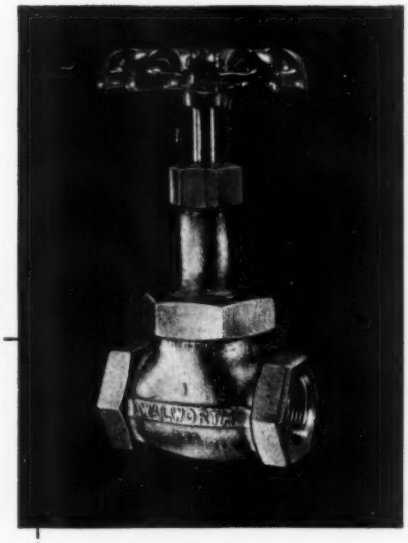
The obvious way to check temperatures was to use recording thermometers or maximum indicating thermometers. However, these instruments were too bulky to use inside the small packages of the mixture.

The answer to the problem lay in the use of chemical thermometers—

**IDENTIFICATION DISC:** An aluminum marking plate on all Walworth No. 225P's facilitates inventory control and makes reordering quick and positive.

**NEWLY DESIGNED HANDWHEEL:** Patented air-cooled, finger-fit handwheel affords sure grip even with greasy gloves.

**IMPROVED PACKING:** Molded packing of lubricated asbestos reinforced with copper wire. Suitable for practically every service. Valves can be repacked under pressure when fully opened.




# take a good look at the Walworth "500 Brinell" no. 225P Globe

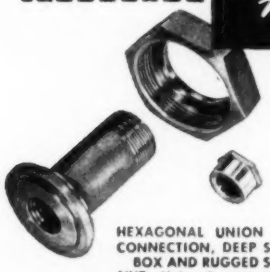
## – the Toughest Bronze Valve Your Money Can Buy

The stainless steel, corrosion resistant seats and discs are heat treated to a hardness of 500 Brinell – hard enough to scratch glass and crush nails! The valve can be closed on sand, slag, and pipe scale without injury to the seating surfaces. "Wire drawing" is practically eliminated. All parts are accurately machined and gaged. Years of tight, positive shut-off are assured.

Available in both globe and angle types (angle type: No. 227P) in sizes ¼" to 2", this quality valve is recommended for 350 lbs. W.S.P. at 550 F, and 1000 lbs. non-shock service on cold water, oil, gas, or air.

For full data on this long-life, economical Walworth Bronze Valve, see your local Walworth distributor, or write for Circular.

## note these 7 Great Features



**HEXAGONAL UNION BONNET CONNECTION, DEEP STUFFING BOX AND RUGGED STUFFING NUT:** Union bonnet connection eliminates any chance of distortion or leakage even though valve is repeatedly taken apart and reassembled.

**OVERSIZE STEM:** The high-tensile strength silicon-bronze stem assures long life and protection against wear.

**SEATS AND DISCS:** Plug type seats and discs of stainless steel, heat-treated to 500 Brinell hardness and machined simultaneously to a mirror-like finish, with accurate tapers assures tight positive shut-off with minimum handwheel effort.

**EXTRA STRONG BODY:** Made of Composition M (ASTM B61) bronze. Thick walls and rugged hexes provide a high safety factor. Valves undergo hydrostatic shell test of 1,000 psi.

# WALWORTH

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**60 EAST 42nd STREET, NEW YORK 17, N. Y.**

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## How ACCO REGISTERED Stock Slings Save You Money—with Safety

1 • **You Get ALL the Strength You Pay For**—DUALOC* Endings insure against any loss in the catalog strength of the preformed Green Strand wire rope the sling is made of.

2 • **You Lower Your Sling Maintenance Costs**—If damaged, any part of the sling can be replaced in your own shop with another ACCO *Registered* part of equal strength. No delay. You don't ship the whole sling to have one part repaired.

3 • **ACCO Slings are Stocked by Your Industrial Supply House**—His stock is based on YOUR needs. So, your sling inventory can be held to a minimum since your distributor's stock is as close as your telephone.

4 • **These Slings and Fittings are "ACCO *Registered*"**—This assures you of highest quality and safety throughout.

Write today to our Wilkes-Barre office for name of the ACCO *Registered* Sling distributor nearest you.

*Trade Mark • Patent No. 2463199

ACCO

WIRE ROPE SLING DEPARTMENT
AMERICAN CHAIN & CABLE

TRADE MARK

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO Registered DUALOC Slings

**For more facts circle 531 on Reply Card**


# PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

glass tubes approximately two inches long, with an inside diameter of about 3/16 in., filled with various chemicals in crystalline form.

Each of the chemicals used had a different melting point, and by checking which of them had melted during transit, the maximum temperature at certain points was recorded with reasonable accuracy.

Six tubes, formed into a bundle, were used for each test.

To prepare a thermometer, one end of a tube was heat-sealed and allowed to cool. A small amount of the crystalline chemical was then tapped into the tube. About one-half gram or less was sufficient. In order to seal the open end of the thermometer without melting the crystals, the tube was inserted into dry ice. *From an article by C. E. Felt, in Progress Thru Research, published by General Mills, Inc., Minneapolis, Minn.*

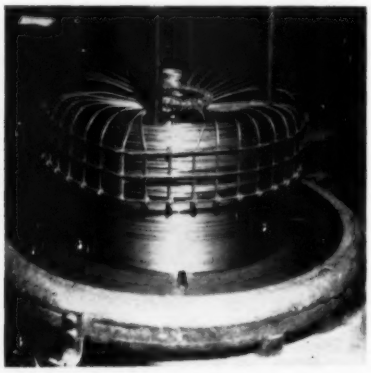
## Basket Confines Whirling Wire

FLYING, BROKEN ENDS of wire, spinning onto reels at the rate of 1400 feet every minute, have in the past been a constant hazard in the wire mill at Colorado Fuel & Iron Corporation.

This hazard has been overcome by the use of a welded-wire basket safety guard, which retains the drawn wire in a tight roll on the machine block, eliminating the strain of unbalanced reeling as the wire builds up on the block.

Forming the basket demands special attention of welding machines. The skeleton of steel must be properly spaced to allow bending and fitting over block pins, while annealing of the finished basket is necessary to eliminate breakage under pressure.

Planning of the device, from many experimental models, was coordi-



**Welded-wire safety baskets are now a feature on drawing blocks throughout mill. Production is up; accidents down**

an ACCO product

# an Original Idea Plus a Wright Speedway Hoist

• Here's a convenient method of material handling used by P. R. Hoffman Company of Carlisle, Pa. The WRIGHT 1-ton *Speedway* Hoist with trolley is on the second floor. The long-lift lets it raise or lower loads from ground level or basement. Electrical current is carried safely by overhead bus and a flexible remote control unit makes the hoist safe and easy to operate.

This is only one of innumerable ways you can use WRIGHT Hoists to speed the flow of material in your plant. WRIGHT makes electric hoists in sizes from ¼ to 10 tons; hand hoists from ¼ to 50 tons. They are modern in every respect, designed for modern material handling. They will give long, economical service. They will save you money.

***Write** today to our York, Pennsylvania, office for literature on WRIGHT Speedway electric or WRIGHT Safeway hand hoists*

WRIGHT
Hoists
Trolleys
Cranes

ACCO

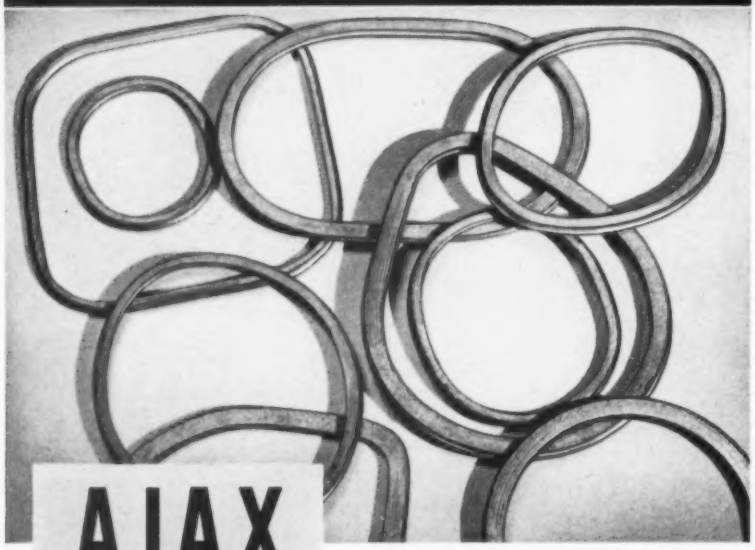
TRADE MARK

**WRIGHT HOIST DIVISION**
**AMERICAN CHAIN & CABLE**

York, Pa., Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

**For more facts circle 532 on Reply Card**

# MILLIONS for the NAVY Plenty, Too, for Industry



AJAX
Spiralwound
GASKETS

Uncle Sam's Navy is a critical buyer and a tough proving ground for any product.

If they're good enough for the Navy, you can be sure AJAX Spiralwound Gaskets are the Gaskets you want.

Get the Gaskets with built-in resilience for safer seals with lighter bolt-loads. The Gaskets that "breathe" with varying pressures and temperatures to keep joints tight under all operating conditions. The thrifty Gaskets that can be reused because they don't lose their resiliency under compression.

Types for all standard flanges and for stationary and marine boilers and accessories. Made of plated low-carbon steel or stainless with fillers of Canadian or Blue African Asbestos.

Industrial Distributors stock them for your convenience. Ask yours or write—

UNITED STATES GASKET COMPANY

FABRICATORS OF "TEFLON" & "KEL-F" FOR THE CHEMICAL PROCESS & ELECTRONIC INDUSTRIES
CAMDEN 1 NEW JERSEY
Representatives in Principal Cities Throughout the World

For more facts circle 533 on Reply Card


# PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

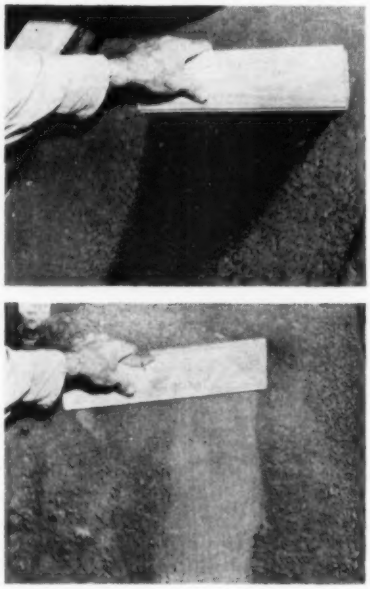
nated by Harry Roe, wire mill millright.

Loss of time and material due to wire breakage have been greatly reduced and there have consequently been fewer shut-downs for replacements. *From Blast, published by Colorado Fuel & Iron Corporation, Pueblo, Colorado.*

## Screen Kept Clear Electrically

A RELATIVELY NEW application for the versatile talents of electric heat has been reported from Pittsburgh where kilowatts are doing a good job of keeping screens clear at the Graff-Kittanning Clay Products Company.

In the manufacture of clay products, the clay is first ground and then screened to provide a uniform



**Screen at top shows results of electric heat application. Moist clay clogs the unheated screen in the lower view**

particle. Any particles which do not pass through the screen are returned to the dry pan to be reground.

Since the clay may contain as much as 15 per cent moisture, surface tension often causes the particles to build up on the wire, plugging the screen openings.

To prevent clogging of the screens, company engineers brazed a copper bar along the long side of the 4 by 6 ft screens. A current of 2 to 5 v is impressed on the screen, generating sufficient heat to overcome surface tension.

With the heated screen, finer and more uniform clay products are ob-

tained, the finished product has less blisters, is less porous, and has higher test strength.

Screen life is likewise increased several times and labor cost is reduced since it is no longer necessary to have someone constantly beating or scrubbing the screens.

In addition, because less clay returns to be reground, there is approximately a 20 per cent reduction in dry pan operation.

With this reduction in operating time, Graff-Kittanning saves more kilowatthours due to lessened power requirements for grinding. Net saving in this instance is approximately 1100 kwhr per month. *From Load, published by General Electric Co., Schenectady, N. Y.*

## On Metal Cladding

FOR MANY YEARS, the Superior Steel Corporation has been making clad metals. Recently the firm's production capacity has been increased through the addition of a new plant which will make industrial sandwiches for the government.

One of the interesting pieces of equipment in this plant is the billet assembly table. Suction cups are used to pick up a copper slab and place it on the assembly table. A magnet then lifts the steel billet and drops it gently over the copper slab. To complete the job the suction cups pick up another copper slab and position it on top of the steel billet.

Something new in welding technique is used in this metal cladding process. The specially designed welding apparatus contains two heads and welds in a horizontal position. Unlike other machines where the heads move across the work, this equipment remains stationary while the work passes between the welding heads. This is the only electric welding machine of its kind in American industry.

The machine welds steel channels to the sides of the clad billet. The channels are closed over the copper to hold it in position after welding and prior to rolling.

The sandwich is heated and hot rolled into strip, pickled, cold rolled, normalized or annealed, repickled and slit into desired widths.

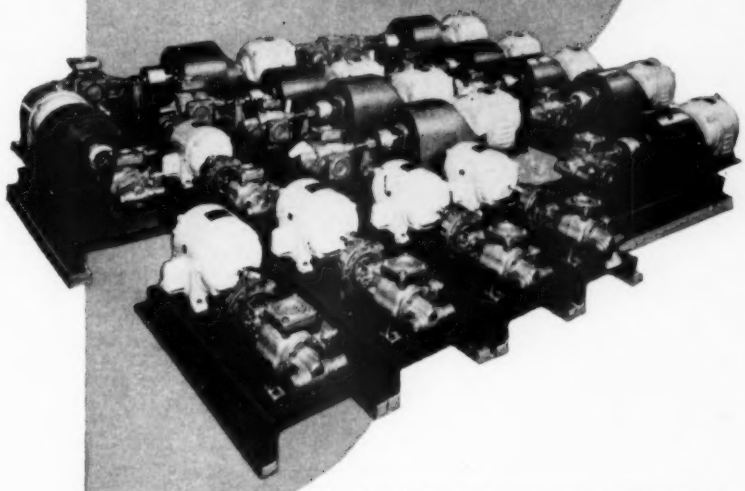
The finished strip consists of specified thicknesses of cladding metal inseparably bonded to one or both sides of the core and in condition for blanking, drawing or whatever processing is required to produce an end product.

The average steel billet is approximately 120 in. long, 17½ in. wide, 3½ in. thick and weighs about 1½ tons. The assembled clad billet is 4⅞ in. thick before hot rolling and the finished strip is 0.030 in. after all hot and cold roll operations are complete.

In the cladding process distinct advantage can be taken of the better properties of the several different


ROPER

fills a BIG ORDER . . . for a BIG PROCESSING INSTALLATION



Big order, yes! And the BIG factor that prompted the selection of the fifteen Roper Series 3600 Pumps shown was *dependability.*

*Dependability* as only painstaking engineering, quality components, and accurate assembly can bring.

*Dependability* that serves your interests on both long and short runs whether handling thick or thin liquids.

Roper Series 3600 Pumps feature hardened helical gears running in axial hydraulic balance, high lead bronze bearings, split ring packings and split gland, and adjustable relief valve . . . are made in 40 to 300 G.P.M. sizes — pressures to 60 P.S.I. Send today for Catalog 953 giving complete data on Roper pumps, or see your Roper distributor.

ROPER Rotary Pumps

GEO. D. ROPER CORPORATION
147 BLACKHAWK PARK AVENUE, ROCKFORD, ILLINOIS

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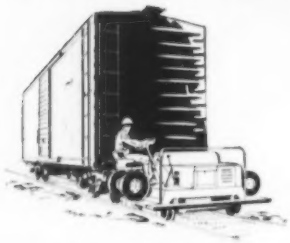
Road to Track in 30 Seconds!

# MOVE RAILWAY CARS quickly, easily... at low cost!


Moves Box Cars, Tank Cars, Gondolas Flat and Hopper Cars!

Get fast, flexible lower cost car moving with the Whiting Trackmobile! It's always ready for spotting, switching or hauling. It travels on road or track, changes from one to the other in half a minute, moves from job to job without delay. The Trackmobile requires only one operator, handles easily with automotive type controls, and employs a special hydraulic jacking action on the mated couplers to develop a maximum draw-bar pull of 8400 pounds! It frees larger locomotives for other tasks, helps reduce work crew waiting time, cuts demurrage and outside switching costs . . . keeps cars, materials and men on the move! Get complete information today!

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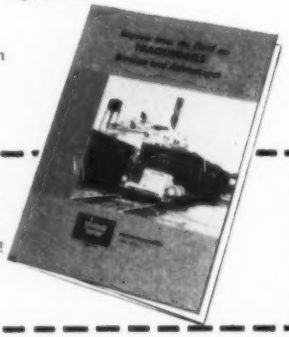
**Other Whiting Equipment to Speed Handling**—Overhead Cranes, Trambeam Overhead Handling Systems, Electric Chain Hoists.



**PROVED ON THE JOB!** "Reports From the Field on Trackmobile Savings and Advantages" shows actual Trackmobile dollar benefits . . . ask for your copy today!

**For more facts circle 535 on Reply Card**


# PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

metals. The surface of clad metals is always solid metal of which it is composed. The core metal is also in the best condition for the service it is intended, be it annealed or heat treated. *From a release for Superior Steel Corporation, Pittsburgh.*

## Berries Float to Plant

A BELT CONVEYOR was formerly used by the Ocean Spray Co. of Hanson, Massachusetts, to move loads of cranberries to the canning plant. However, both the cranberries and belting suffered because the natural wax rubbed off on the belting. Something had to be done.

A concrete sluiceway about 1/10 mile long, a few feet wide and 2 ft deep was constructed as a channel. A Deming centrifugal pump was installed to pump water through the channel and back through a pipe line in a continuous cycle.

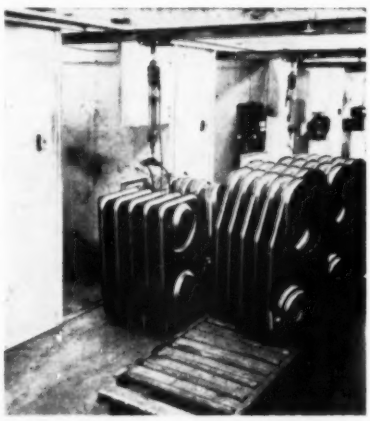
Now the cranberries are carried along with the water and are washed in the process. This arrangement solved a real problem of materials handling and saved money over former methods. *From the Pump-Kin, published by Deming Co., Salem, O.*

## Dutch Doors for Welding Booths

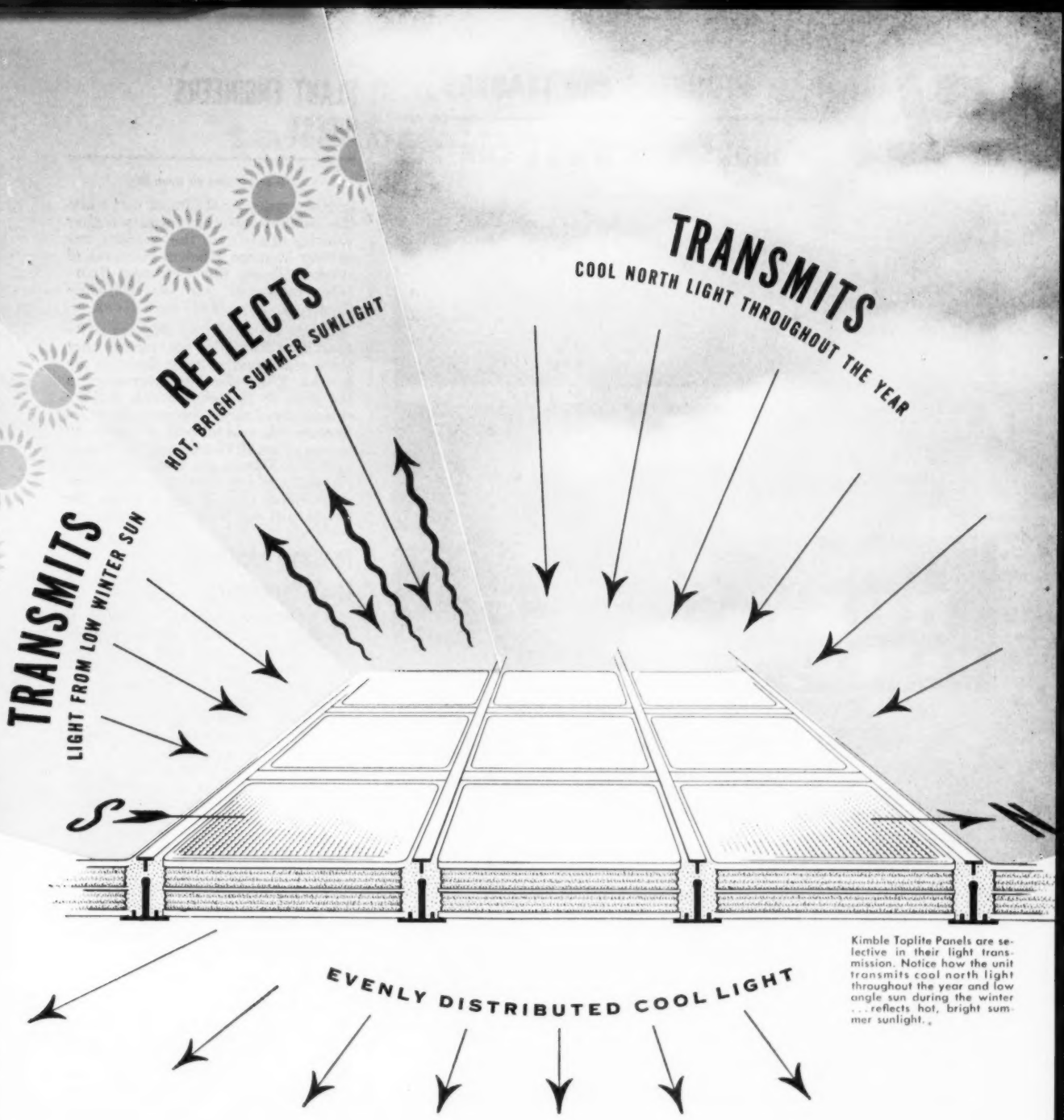
UNUSUAL DUTCH-DOOR openings are a feature of the new welding booths installed in the North Plant of the Coleman Co., Inc.

The doors serve several purposes. They permit the entrance and exit of small parts without opening the entire doorway. This also makes for greater safety, since it cuts the reflection of the arc to both a welder in another booth and to any person passing the door.

Large exhaust fans on top of each



**Dutch-door opening to welding booths is a safety feature. Hoists will eventually be replaced by small conveyors**




Kimble Toplite Panels are selective in their light transmission. Notice how the unit transmits cool north light throughout the year and low angle sun during the winter . . . reflects hot, bright summer sunlight.

## ANNOUNCING TOPLITE—*a new idea in daylighting*

**Kimble Toplite Panels limit and control the heat and amount of light entering a building from overhead.** Here is the new way to daylight deep interior areas too far removed to be effectively reached by conventional, side-wall, prismatic glass block panels.

Kimble Toplite Panels distribute diffused daylight evenly over wide areas that are far from outside walls. They reflect hot summer sun . . . have unusual ability to reduce solar heat transmission. There are no hot spots, eye-fatiguing glare, nor concentrations of light. Kimble Toplite Panel Units have an insulating value equivalent to double glazing or side-wall glass block.

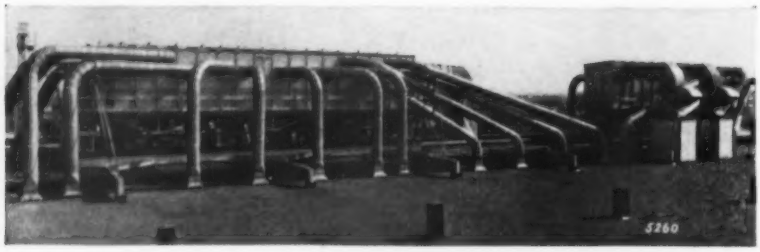
Want more information about this great, new advance in daylighting? Write Insulux Glass Block Div., Kimble Glass Company, Dept. PE7, Box 1035, Toledo 1, Ohio.

Kimble Toplite supplements Insulux Fenestration in deep rooms.

**KIMBLE GLASS COMPANY**

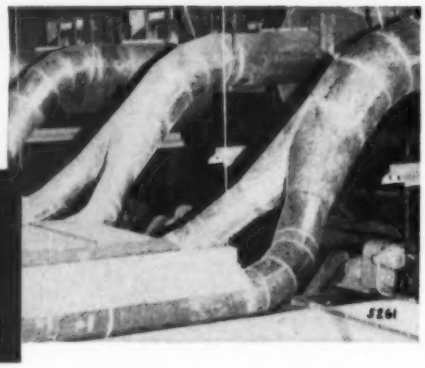
Toledo 1, Ohio—*Subsidiary of Owens-Illinois Glass Company*

# SLY PIONEERS and LEADERS in INDUSTRIAL DUST CONTROL



Philip Morris plant at Louisville, Ky. with Sly Dust Filters on roof.

Ducts leading from tobacco separators to Sly Dust Filters handling a total of 96,000 cfm.



**NO DUST HANG-OVER**

## PHILIP MORRIS IS GLAD THIS YEAR THEY INSTALLED *SLY* YESTERYEAR

• Something wonderful happened in the construction of this modern Philip Morris plant. It was designed and equipped for *dust-free* operation.

Tobacco dust, created in stemming operations, is drawn through ducts to the four large Sly Dust Filters on the roof, and thoroughly filtered.

The clean air is then returned to the plant and recirculated — saving substantially on winter heating costs.

Philip Morris knows the value of Sly Dust Filters by experience, having purchased these units throughout the past five years.

Because of their larger filtering capacity and easy replacement of bags, Sly Dust Filters offer definite advantages in economy of operation and lower maintenance.

If you will tell us your dust problem we shall be glad to tell you what can be done about it and give you an estimate of cost.

THE W. W. SLY MANUFACTURING CO.

4600 TRAIN AVENUE • CLEVELAND 2, OHIO

New York • Chicago • Philadelphia • Syracuse • Detroit • Buffalo
Cincinnati • St. Louis • Minneapolis • Birmingham • Los Angeles • Toronto

For more facts circle 537 on Reply Card


# PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

booth remove 1500 cfm of air, while the smaller opening permits higher velocity of air over the welders, resulting in more efficient removal of smoke. *From the Coleman Spot-Lite, published by the Coleman Company, Inc., Wichita 1, Kans.*

Editor's Note: *Since this was written, the company has stated that work still remains to be done on the booths. The roller conveyor seen on the floor in the photograph will be raised about three feet and the combustion chambers will be slid by means of small conveyors, leading to each booth from the large conveyor, through the upper part of the Dutch door. When this change is made, the hoists will no longer be necessary.*

## Turntable Facilitates Truck Turnabout

A STEEL TURNTABLE has made it possible to utilize a comparatively small basement area in a San Francisco department store, as a turning station for delivery trucks.

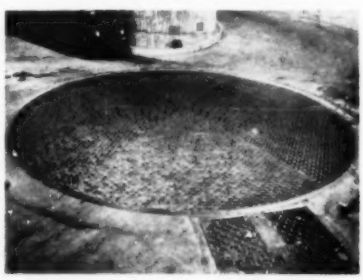
The area was too limited to enable the trucks to be turned around by the driver through use of the steering wheel of the truck.

However, the space was made suitable for this very operation by installing a 25 ft diameter steel turntable, designed and built by the Link-Belt plant in San Francisco.

The turntable pivots in a bushed central pedestal and is supported under its outer edge on large-diameter, heavy duty casters, rolling on a circular rail.

By pressing a button, the table is rotated by a 2-hp electric motor through a vertical enclosed worm gear drive, connected to the outer circumference of the table by a driving hub and a surrounding strand of malleable iron drive chain.

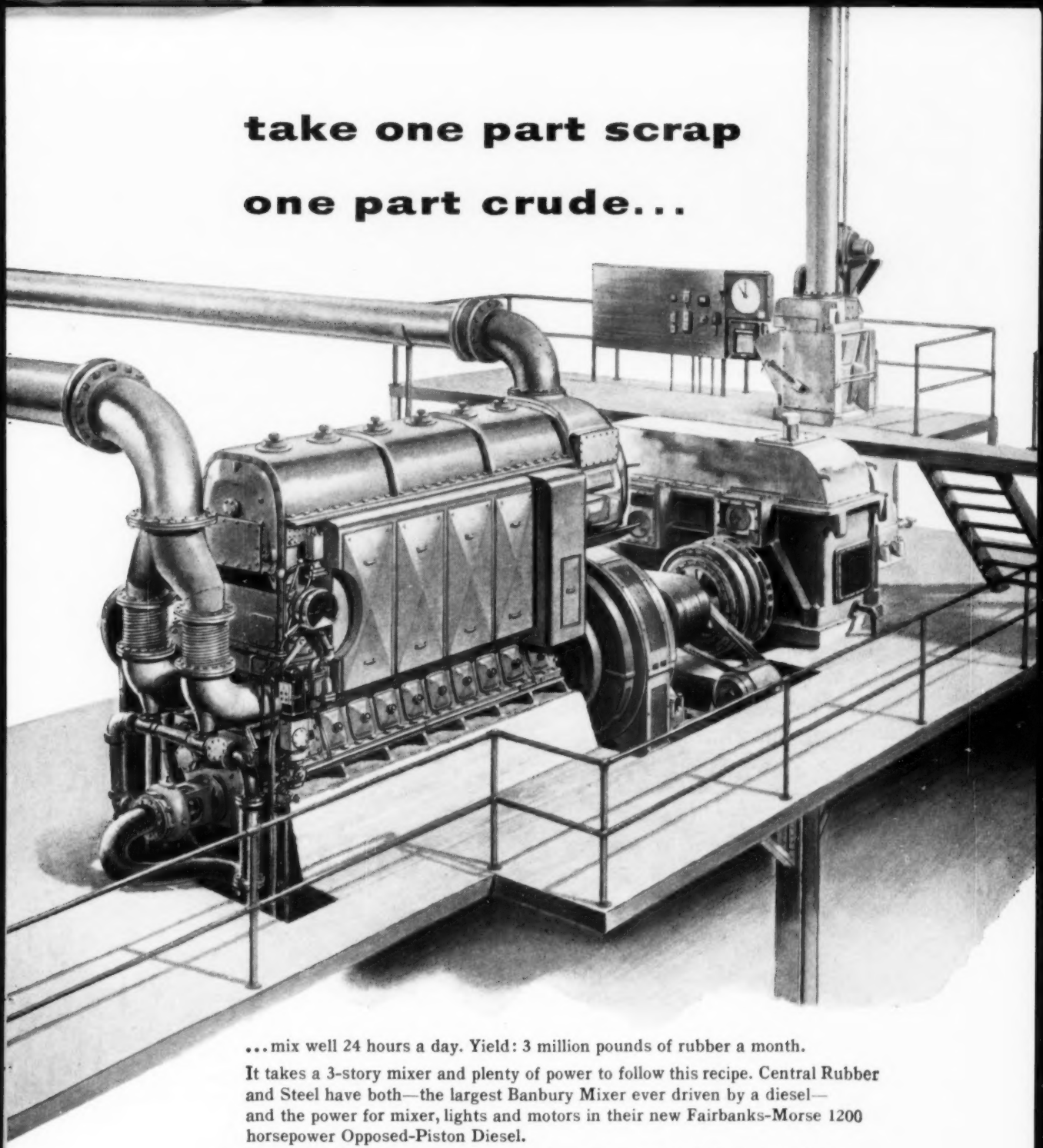
The motor-drive is located in a shallow concrete well under the steel grating seen at lower right edge of the picture. *From Link-Belt News, published by the Link-Belt Company, Chicago 1, Illinois.*



Steel turntable allows delivery trucks to turn around in the limited space

# take one part scrap

# one part crude...



...mix well 24 hours a day. Yield: 3 million pounds of rubber a month.

It takes a 3-story mixer and plenty of power to follow this recipe. Central Rubber and Steel have both—the largest Banbury Mixer ever driven by a diesel—and the power for mixer, lights and motors in their new Fairbanks-Morse 1200 horsepower Opposed-Piston Diesel.

Fairbanks-Morse Performance ... so often the answer to Industry's problems.

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**FAIRBANKS-MORSE**

*a name worth remembering when you want the best*

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY
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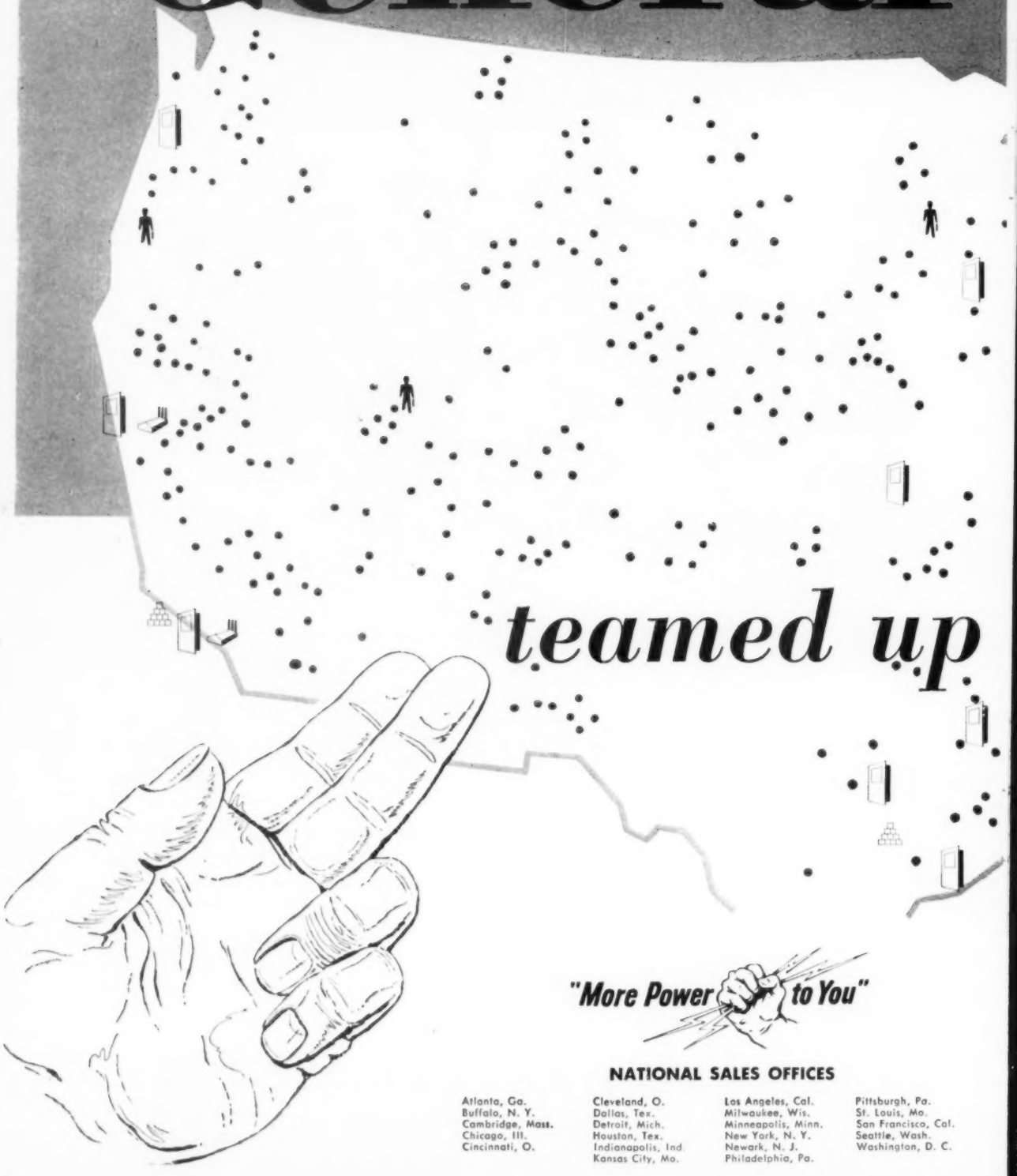
# General



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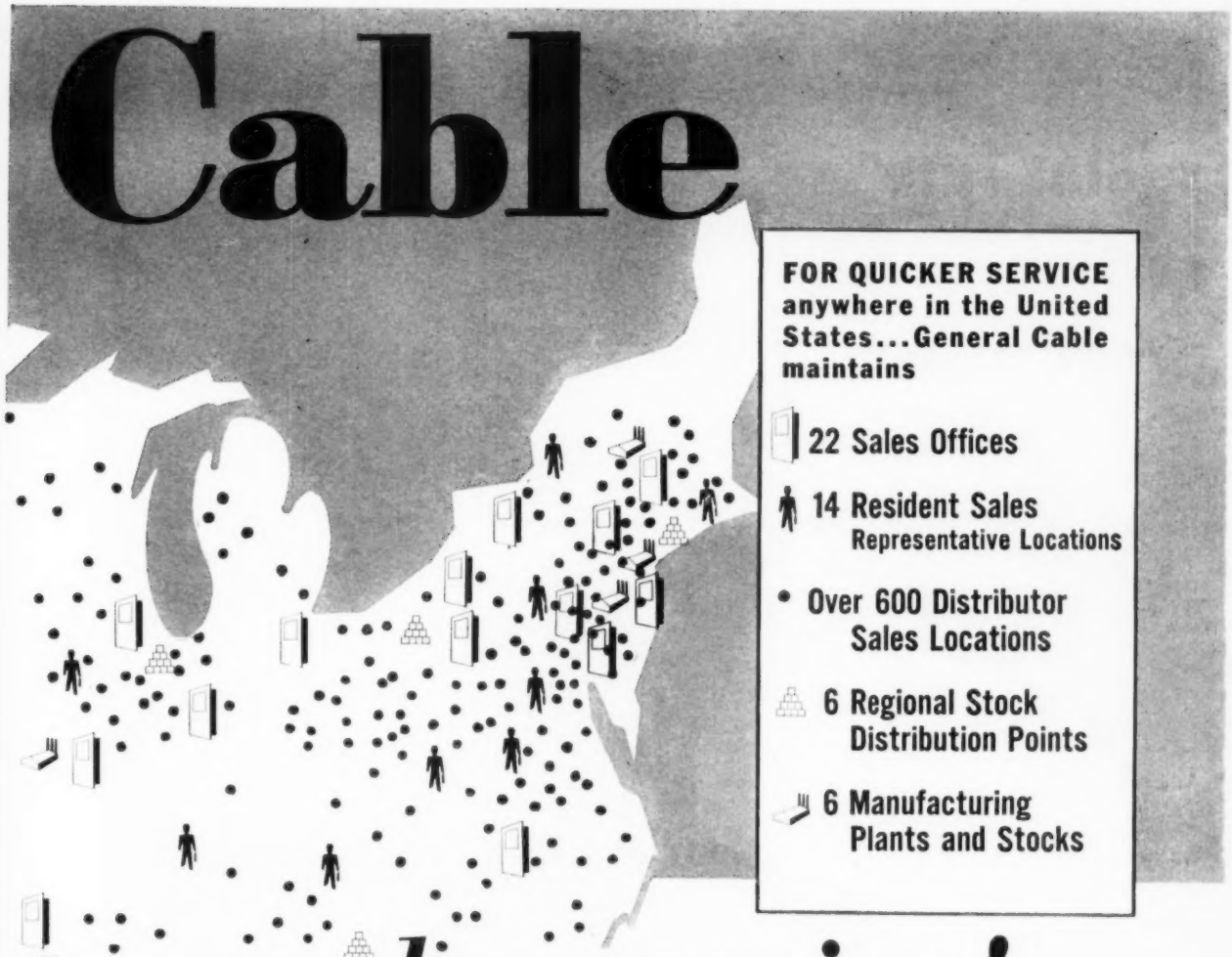
# Cable



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General Cable is an institution that stands for nation-wide service points, strategically located . . . Field Offices to render on-the-spot service . . . Teamed with important supply houses to put General Cable products on a local delivery basis from local distributing points.

Whatever your electrical wire and cable need, whenever you need it, make "General Cable" a part of your product description.

***One Source of Complete Supply***
***One Completeness of Service***
***One Standard of Quality***

## GENERAL CABLE
CORPORATION

Executive Offices: 420 Lexington Avenue, New York 17, N. Y. Sales Offices in Principal Cities in the United States.

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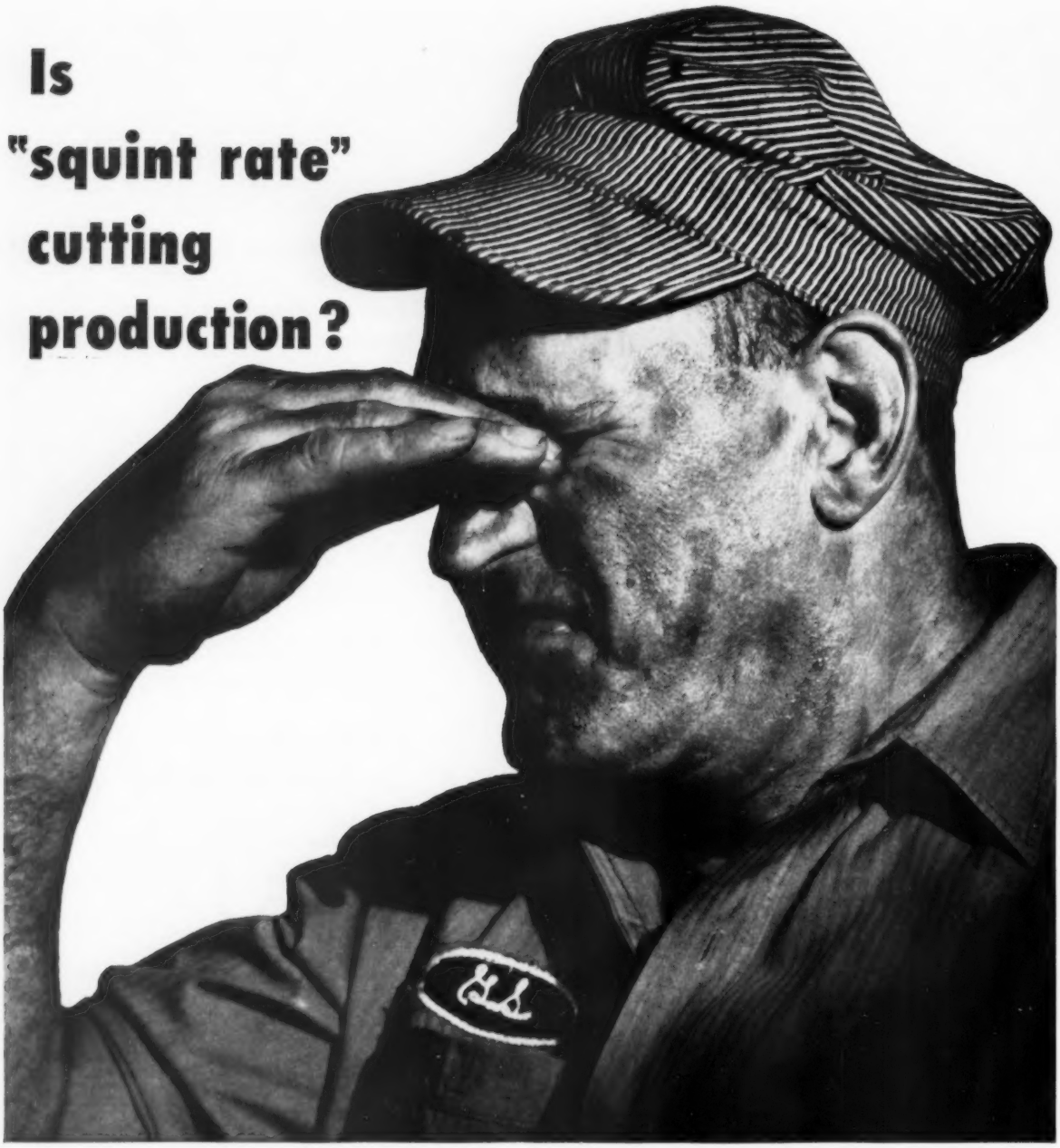
# Is "squint rate" cutting production?



If, occasionally, a man in your plant stops his work, squints, rubs his eyes—that could be defective eyesight.

But, if man after man is showing this tell-tale sign of faulty vision — there's something else wrong. And it's an odds-on bet that the cause is bad lighting.

Inadequate or glare-ridden plant lighting, or both, can't help but eat into your people's efficiency and cut production. The very first requisite of a good man, no matter how skilled, is that he be able to see what he's doing, easily, comfortably, without strain.

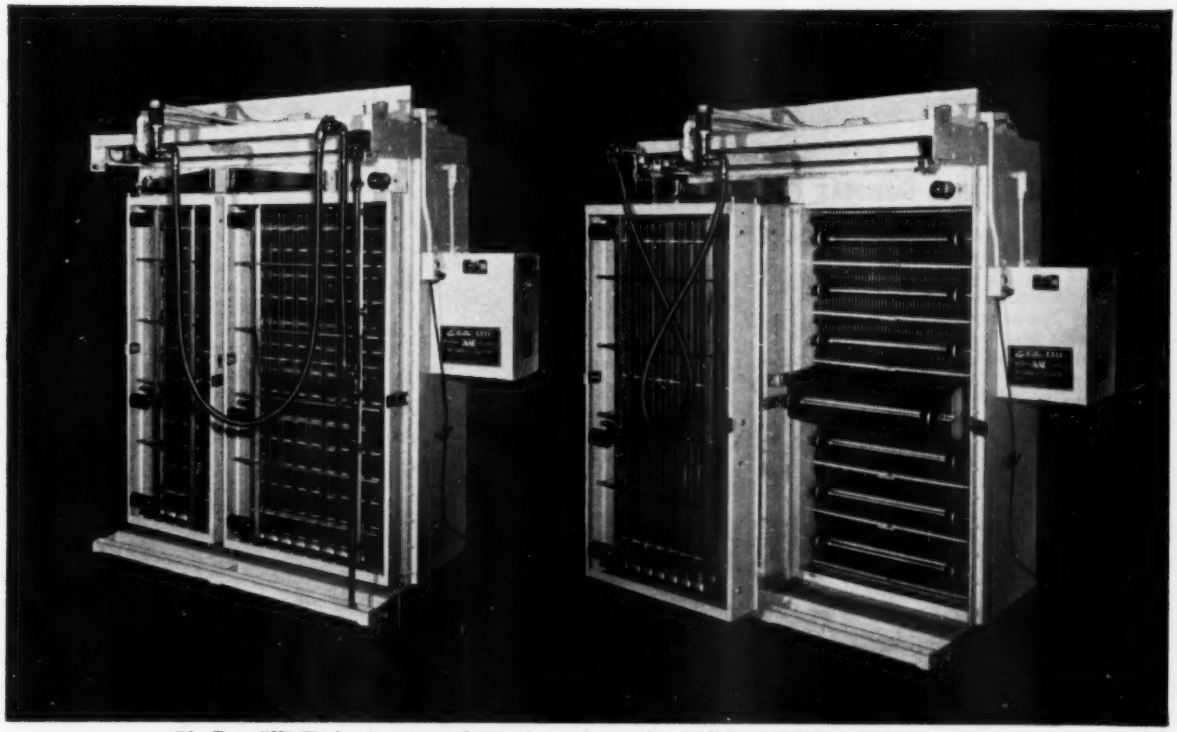
Poor plant lighting is unfortunate, too, because the difference in first cost between a good and bad installation is surprisingly little. And the healthy upsurge of production you get with good lighting returns many times over that small difference in cost.

Check the "squint rate" in your plant. Isn't it time to call a halt on lighting that's *costing you money?* Isn't it time to change to lighting that *helps production?* Write for information about Day-Brite's CFI DAY-LINE® industrial fixtures—called CFI because they're designed and built to guarantee COMFORT FOR INDUSTRY.

**For more facts circle 540 on Reply Card**

"DECIDEDLY BETTER"
**DAY-BRITE®**
*Lighting Fixtures*

*Day-Brite Lighting, Inc., 5439 Bulwer Ave., St. Louis 7, Mo. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.* 348



*The Type "H" Washer incorporated as an integral part of an ELECTRO-CELL precipitator provides "push button" control of the cleaning operation. The washer travels on an overhead trackway which keeps it operating freely. The vertical header carrying the spray nozzle is rotated at each end of the travel to provide the necessary 5 degree lead to assure thorough cleaning of the plates. RIGHT: Shows how the hinged ionizers can be opened freely to permit removal or inspection of the plate cells.*

# ANNOUNCING THE **NEW** ELECTRO-CELL TYPE "H" WASHER
## with push button control

Here's another *first* from the engineering department of American Air Filter Company. The new Type "H" Washer on the famous ELECTRO-CELL precipitator is a major contribution to the field of electronic air cleaning equipment—another important reason for AAF leadership!

Fully automatic, the spray head moves back and forth across the face of the removable plate cells. Accumulated dirt and dust is washed away—maintaining the high cleaning efficiency of the ELECTRO-CELL . . . which provides super clean air for many critical industrial and commercial uses.

The new Type "H" Washer has many advantages including its nominal cost. It in no way interferes with the opening of the hinged Ionizers or removing the plate cells.

Another exclusive feature of the new Type "H" Washer is the positioning of the spray-heads. These are automatically adjusted to always point at a 5 degree angle in the direction the spray-heads are travelling. This insures thorough washing action over the entire depth and each side of each individual plate.

The water used by the sprayer is controlled by a solenoid valve connected with the spray-head motor drive and is synchronized with the travelling spray-heads.

The ELECTRO-CELL, long famous in the field of electronic air cleaning, removes dust, dirt and even smoke from the air. With the addition of the Type "H" Washer it is even more efficient and practical to operate . . . and maintenance is reduced to a minimum!

Write the American Air Filter Company for technical data and descriptive information on this latest AAF achievement. AAF experience will help you solve all of your air cleaning problems.

*expect the best from . . . . .* AAF

**American Air Filter**
COMPANY, INC.
228 Central Avenue • Louisville 8, Kentucky

**For more facts circle 541 on Reply Card**

# OPERATION AND PRODUCTION pointers for the industrial plant engineer

*Edited by H. E. B. Anderson*

## Coolant Filter Salvages Diamonds

AN ORDINARY SACK may be the answer to greater diamond salvage in industry.

At the Edmore, Mich., plant of Carboloy Department of General Electric Co., a common cloth sugar bag is the main component of a simple method of salvaging diamonds from grinding sludge—recapturing enough diamonds in a month to have them made into four or five additional grinding wheels.

The bag acts like a coffee strainer. It is tied to the exhaust end of the coolant pipe leading from the machines which grind cemented carbide tools with diamond grinding wheels. When other types of grinding wheels are used on the same machines, the bag is removed to allow the coolant and non-diamond sludge to exhaust into the regular coolant reclamation system.

**The common sugar bag is the answer for reclaiming diamonds from sludge**

The "bag system" still enables the coolant to flow into the reclamation system, but instead of making it necessary to clean out all of the sludge from the tanks, and processing it for the diamond particles, the bag saves only the sludge coming from the diamond grinding wheels.

A company using this system has a choice of either selling the salvaged diamonds to a reclaiming company for roughly $1.50 per karat, or paying for the service only and having the diamonds returned.

## Gage Testing Unit Built Around Motor-Driven Gear Pump

**Contributed by Robert Erdman, Allis-Chalmers Manufacturing Co.**

THE ADDITION of a motor-driven gear pump to a dead weight gage tester has speeded the testing of Bourdon gages on the Allis-Chalmers pump test floor.

Prior to the mechanization, the gages were tested using a static gage tester and a hand pump to build up pressure. Although suitable for lower pressures and fewer gages, the rapid testing of high pressure gages was a difficult task.

With the new set-up, a motor-driven pump set on top of a small oil reservoir builds up the pressure to the highest gage scale reading, and is then shut off. A check valve in the line between the pump and the gage maintains the pressure against the gage, after pump stops.

A drain valve installed in the line behind the gage permits controlled release of the oil pressure against the gage, and equivalent weights can be removed from the dead weight tester, to check the gage in increments of pressure from maximum to minimum readings.

**Gage testing equipment, with powered pumping unit, mounted for portability**

## X-Ray Checks Liquid Level

A CRYSTAL of cadmium sulfide, about the size of a match head, acting on signals from an 80,000 v X-ray tube, is doing a "watchdog" job for major brewers, insuring exact measure and tight closure on beer cans.

The crystal is an important part of a unit known as a high-speed level checker, capable of inspecting cans or cartons at and above a speed of 900 containers per minute, with accuracy to 30 drops of beer, or 1/64 in. in height.

In addition to beer, the unit can be adapted to inspection of products such as milk, juices, waxes, oils and chemicals, in liquid form; salt, cereals and soaps, in granules; and powdered materials of all kinds.

The cadmium sulfide crystal is grown in vapor-filled hothouses at General Electric's X-ray plant in Milwaukee. With the crystal in place, the detector unit is set at the desired height of fill on one side of the conveyor line, and the X-ray tube is set on the other side.

When a can or carton that is not filled comes along the line, the crystal receives an extra jolt of X-ray from the tube, which changes it from a non-conductor to a good conductor of electricity. As a conductor, it completes an electric circuit, which in turn operates an air-blast unit. This unit then blows the faulty container off the conveyor line as a reject.

## Stoker Fed by Lift Truck

A REDUCTION of 96 manhours a week, in the stoking of furnaces, has been effected by Union Steel Products Co., Albion, Michigan. A Clark industrial truck with a shovel attachment is now in use for transporting and handling coal for the furnaces.

The shovel attachment will handle 15 cu ft at one time. The truck is used solely for bringing coal into the furnace room from outside stor-

# OVERHOISTING FEAR

**YOUNGSTOWN** *Safety* **LIMIT STOPS** *for Crane Hoists*

This Limit Stop not only *disconnects* the motor from the line, but *stops* the motor quickly. On D-c cranes, where high hoisting speeds prevail, dynamic braking aids in bringing the hook block to rest.

Since this Limit Stop is operated directly by the hook block, stretching of the hoisting cables does not affect the tripping point. By removing the fear of an overhoisting accident, the YOUNGSTOWN Limit Stop enables the crane operator to do better work.

*A crane *without* a Youngstown is as risky as a boiler *without* a safety valve.

**Easily applied to both new and existing A-c and D-c Cranes.**

***WRITE FOR BULLETIN 1032***

E&M

**For more facts circle 542 on Reply Card**

# OPERATION & PRODUCTION

(O and P begins on page 52)

**Operator works in close quarters in boiler room as he dumps load of coal**

age. One man operates the truck on each shift, and the truck is used 24 hours per day.

Despite the extremely cramped conditions, the truck can be maneuvered with minimum difficulty, to dump the load into stoker hoppers.

## Boiler Fan Safety Control

**Contributed by H. Nye Josleyn**

OCCASIONAL FAILURE of the drive on an induced draft fan built up excessive temperatures and pressures in the boiler which it served. Development of an automatic control relieved this condition by providing for automatic opening of a damper placed in the draft by-pass duct.

The hand operated damper, placed in a short duct connecting the boiler directly to the stack, could not be opened fast enough to maintain the necessary draft in case of a fan failure.

The fan was dual driven. One end of its shaft was connected to a 60 hp motor, the other end, through a clutch, to a steam turbine. The electric drive was normally used.

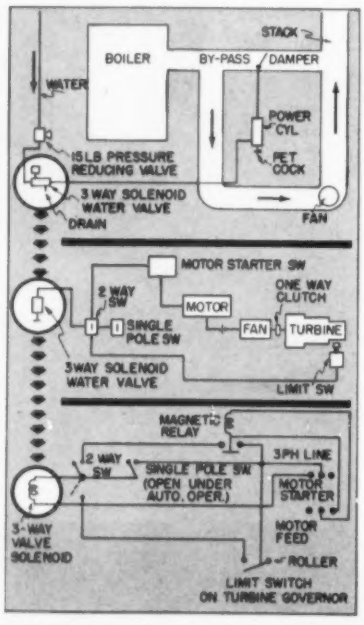
A system was devised, built around a 3-way solenoid operated water valve, to open the by-pass damper automatically in the event of a fan failure. Interruption of the circuit to the solenoid opened the valve to allow water to flow to a piston connected to the damper operating mechanism. When the valve opened, the piston closed the damper. A pressure reducing valve controlled the piston speed. Reclosing the circuit to the solenoid closed the valve, shut off the water supply, and drained the water line to the piston through the third valve opening.

Under normal operating conditions, the solenoid is kept activated by a circuit from the power feed line. This circuit passes through a magnetic switch, energized by the motor feed circuit. Thus, when the motor current fails, the current to the solenoid is interrupted, and the operational sequence is set in motion to close the damper.

Similar results are accomplished when the fan is driven by the steam turbine. Action of the safety stop trip on the turbine operates a limit switch which interrupts the circuit to the solenoid.

Flexibility between the two circuits was obtained by installing two toggle switches in the system. One is a 2-way switch for alternate automatic control of either the electric motor or steam turbine drive. The other is a single pole switch used for starting the fan. On this switch, one position, Hand, closes a circuit which by-passes the solenoid valve while starting the fan. After the fan is up to speed, the switch is changed to the other position, Automatic, which allows the valve to perform its emergency function if required. The effective circuit is indicated by the position of the 2-way switch, on Motor or Turbine.

When starting the fan with the motor drive, the 2-way switch is placed in the Motor position and the single pole switch in the Hand position. As the motor comes up to speed, the damper is slowly closed, relieving any pressure on the piston by opening a petcock on the cylinder. The switch is then changed to the Automatic position.




**General layout, one-line, and circuit drawings show use of solenoid valve**

When starting the fan with the steam turbine drive, the same procedure is followed, with the exception of placing the 2-way switch in the Turbine position.

## Rolling Drum Rack for Lubricants

Photo: Lincoln Electric Co.

**All-welded drum rack adds mobility to lubricant storage at Premium Die & Tool Corp., Jamestown, N. Y. Small angle iron and bar stock was used**

## Driver Competition Saves Trucks

A UNIQUE fork truck driver competition has fostered increased safety for the drivers, at the American Finishing Co., Memphis, Tennessee. The program has also been responsible for decreases in operating costs and equipment maintenance charges.

Each driver is assigned his own truck. If he handles the equipment in a rough manner or damages materials with his equipment, he is given a warning about careless operation; a second offense means a one-day layoff; a third offense demands a one-week layoff; the fourth offense automatically calls for discharge. The second or third offense, if circumstances warrant, can be followed by discharge.

When the company receives a new truck, the selection of the driver is contingent upon his safety record and his cost record of truck operation. In assigning the new equipment to the driver, the company points out these factors, as the reasons for his selection. It takes five years to become eligible for the job.

Operators are enthusiastic about the competition, and the company finds costs have tumbled. For example: the cost of operating a single truck for an entire year, including amortized cost of the truck, is only $1358.94.

American Finishing, using Elwell-Parker equipment, has compiled an amazing record for more efficient handling, and carloading time has been slashed from 28 to 1.3 man-hours per car.

(Continued on page 57)

# SIX INDUSTRIAL PUMPING PROBLEMS Solved by the MOYNO Pump!

Looking for a pump with a fast-growing reputation for solving tough pumping problems? Then take a look at the simple, versatile Moyno!

Briefly described here are a few of the many successful case histories proving how Moynos handle jobs where other pumps fail. Why is the Moyno a "problem-solving" pump? For one thing, because it differs completely from conventional pumps . . . rotary, centrifugal or piston. Just one rugged moving part—a rotor turning within a stator—does the job.

The list of materials handled by Moyno Pumps gets longer every day. If *you* have a pumping problem, such as handling abrasive slurries, mild acids, caustics, materials that are watery, viscous or even semi-solid—find out if the Moyno can help you! Use the coupon below for prompt, complete information.

**1** **Material:** Chromic Acid.

**Problem:** Material hard on pumps—being slightly corrosive and abrasive.

**Solution:** Moyno pump on duty for the past two years; has required practically no maintenance. Customer very well pleased.

**2** **Material:** Quarried Clay.

**Problem:** 40 to 60% loss of clay slurry.

**Solution:** Moyno pump in use for the past 2 years has reduced above production losses to average of less than 5%.

**3** **Material:** Calcium Carbonate Slurry.

**Problem:** Continuous failures of centrifugal pumps.

**Solution:** Moyno pump still giving perfect service after 1½ years of 24-hour-per-day operation.

**4** **Material:** Special Navy Paint Mixture.

**Problem:** Low volume of gear-type pump; necessity for pre-heating paint before pumping into tank cars.

**Solution:** Moyno cut tank car filling time from 10 hours to 2⅓ hours. No need to pre-heat paint. No maintenance costs since Moyno was installed 2 years ago!

**5** **Material:** Caustic Solution—for use in mercerizing machines.

**Problem:** Rotary pumps wore quickly, lost capacity, and had too little suction.

**Solution:** Moyno pumps cut maintenance and repairs to minimum—had ample suction for drawing caustic through the cloth.

**6** **Material:** Anti-Scale Boiler Treatment (alcohols, oils, anti-foam agents, sludge conditioners).

**Problem:** Frequent pump breakdowns caused by back pressure of 5 spray nozzles.

**Solution:** Moyno pumps cut pumping time from 20 minutes to 3 minutes and also reduced down time. Both helped to increase production 200%!

## FEATURES OF THE MOYNO THAT MAY SOLVE YOUR PUMPING PROBLEM

**Positive Displacement**—Moynos are available to pull up to 29" vacuum while discharging under pressure. Big Moynos deliver up to 250 g.p.m. at pressures to 600 p.s.i.

**Versatile**—Handles liquids, slurries, pastes, even semi-solids. Rotor and stator available in stainless steel, other alloys, or plastics, to meet wide variety of applications.

**Gentle**—No churning; won't break up semi-solids; won't aerate liquids. It even pumps potato salad!

**Reversible**—Pumps with equal efficiency in either direction.

**Trouble-Free**—Self-priming; won't cavitate or vapor-lock. Just one moving part—no valves to stick, no pistons to gum up. Built for tough service. Easy to maintain.

**ROBBINS & MYERS, INC.**

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

Fractional & Integral h.p. Motors & Generators | Electric Fans | Electric & Hand Hoists & Cranes | Moyno Pumps | Propellair Industrial Ventilating Equipment

**Robbins & Myers, Inc.**
**Pump Division, Springfield 99, Ohio** PE-7

Gentlemen: Please mail free copy of Bulletin 30-B containing details on Moyno Pumps.

Name _____ Title _____

Company _____

Address _____

City _____ State _____

**For more facts circle 543 on Reply Card**

# there's Excitement in the AIR!

It's big news for production men! Now, the famous P&H Zip-Lift is offered at this amazingly low price...only $199.50. It's a genuine "Zip", too, with all these important features;

- ***A real wire rope hoist***—safer, more versatile, and easier to use. No bothersome chains—no hidden weaknesses.
- ***25% Overload capacity.*** Guaranteed to withstand overload of 25% above rated capacity during intermittent service.
- ***P&H's new, simplified rope control*** permits fast "one-hand" operation; frees one hand for guiding load.
- ***P&H added values*** include double brakes for greater safety, limit switch, fully enclosed construction, interchangeable mountings, easy working load block, and many others.

*Push-button control also available as optional equipment

CALL YOUR NEARBY P&H DEALER.
LET HIM SHOW YOU WHERE
AND HOW TO CUT COSTS WITH
THE NEW . . . "ZIP."

P&H ELECTRIC HOIST DIVISION
**HARNISCHFEGER**
CORPORATION
Milwaukee 46, Wisconsin

For more facts circle 544 on Reply Card

(O and P begins on page 52)

## Reference Chart Tells Chemical Resistances of Rubber Types

A RESUME, printed in chart form by the Republic Rubber Div., Lee Rubber & Tire Co., presents a quick source for determining the chemical resistance of various types of rubber available for industrial use.

With ratings of A (good), F (fair), C (depends on conditions), and X (unsuitable), the chart classifies the majority of the rubber types, providing an indication of their suitability for a proposed use in contact with chemicals.

(O and P continued on page 58)

Graphical presentation of various types of rubber and their resistance to chemicals

| Reagent | Buna N | Buna S | Natural | Neoprene | Butyl |
|---|---|---|---|---|---|
| COMMERCIAL ORGANIC CHEMICALS: | | | | | |
| Gasoline | A | X | X | A | X |
| Kerosene, Fuel & Diesel Oils | A | X | X | A | X |
| Lubricating Oils | A | C | C | A | X |
| Benzol | X | X | X | X | X |
| Toluene | C | X | X | C | X |
| Petroleum Ether, Naphtha | A | X | A | X | X |
| Hydraulic Oils | A | C | C | F | X |
| Lubricating Greases | A | C | C | A | X |
| Butane | A | X | X | F | X |
| ORGANIC CHEMICALS: | | | | | |
| Amyl Alcohol | A | A | A | A | A |
| Butyl Alcohol (butane) | A | A | A | A | A |
| Methyl Alcohol | A | A | A | A | A |
| Ethylene Glycol | A | A | A | A | A |
| Acetone | X | A | F | C | A |
| Lacquer Thinner (acetates) | X | C | F | X | F |
| Carbon Tetrachloride | X | X | X | X | X |
| Chloroform | X | X | X | X | X |
| Dibenzyl Ether | C | C | C | C | C |
| Freon 22 | F | X | X | X | — |
| ACIDS: | | | | | |
| Acetic Acid | F | C | C | F | F |
| Boric Acid<br>Carbonic Acid | A | A | A | A | A |
| Hydrobromic Acid | C | A | A | A | A |
| Hydrochloric Acid (Conc., 150 F) | A | F | A | F | A |
| Hydrocyanic Acid | F | F | — | F | — |
| Hydrofluoric Acid (60%, 160 F) | X | C | C | A | F |
| Phosphoric Acid | X | X | F | X | F |
| Sulphuric Acid 50%, Cold | F | F | F | F | F |
| 70%, 120 F | C | C | C | F | F |
| Nitric Acid 5%, Room Temp. | X | F | X | X | A |
| 40%, 120 F | X | X | X | X | F |
| Chromic Acid | X | X | X | X | C |
| Carbolic Acid | X | X | X | C | X |
| SALTS: | | | | | |
| Ammonium Hydroxide<br>Sodium Hydroxide | C | C | C | C | A |
| Calcium Hydroxide<br>Magnesium Hydroxide<br>Potassium Hydroxide | A | A | A | A | A |
| Sodium Chloride<br>Potassium Chloride | A | A | A | A | A |
| Zinc Chloride | C | C | C | C | A |
| Sulphur Dioxide | X | X | X | X | X |
| MISCELLANEOUS: | | | | | |
| Hydrogen peroxide | A | F | F | A | F |
| Chlorine Gas, Dry | F | F | A | F | F |
| Wet | F | F | F | F | F |
| Ammonia Gas, Cold | A | A | A | A | A |
| Hot | C | C | C | A | C |

THE MAN WITH THE ANSWER To Your Handling Problems

He's a good man to know — your P&H dealer. You see, he has much more than just hoists in stock. He also has a wealth of experience in "thru-the-air" handling.

Ideas! That's what your P&H hoist dealer can give you! Shortcuts to help you save time! Methods to make man power go further! He'll be glad to put all his knowledge at your disposal. Ask him into your plant. Let him show you how to save important money every month with modern "thru-the-air" handling.

CALL YOUR NEAREST P&H DEALER OR WRITE—

P&H HOIST DIVISION
HARNISCHFEGER CORPORATION
Milwaukee 46, Wisconsin

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Republic
WIRETEX AIR HOSE

Strength of Steel
PLUS+
Flexibility of Rubber

...and there's a NEW
ECONOMY LENGTH

WIRETEX, combining the strength of steel with the flexibility of rubber, brings you economical hose performance. Republic WIRETEX Air Hose easily handles air pressures up to 2,000 psi — and is ideally suited to work on less rigorous jobs, too, where extra service life and trouble-free performance is an asset.

Republic WIRETEX is NEW — a truly modern conductor internally reinforced with high tensile wire. It's easy to handle, unbelievably tough and long lasting. What's more, Republic WIRETEX is built in 60-foot **Economy Lengths.** You save money when you buy Republic WIRETEX; time and money when you use it! Get the facts today! Republic WIRETEX Hose is available in all standard (⅜" to 2" inclusive) sizes.

Your local Republic Distributor can help you plan, select, apply and maintain any Product of Industrial Rubber. If he is not listed in the yellow section of your telephone directory, write us for his name and address.

*"Quality Hose Builders for More Than 50 Years"*

REPUBLIC RUBBER DIVISION
LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO
INDUSTRIAL RUBBER PRODUCTS

For more facts circle 546 on Reply Card

# OPERATION & PRODUCTION

(O and P begins on page 52)

## Improving Plant Elevator Service

A SERIES OF HINTS, presented by the Otis Elevator Co., shows how the plant elevator can be integrated into the over-all materials handling system to make it an efficient, time-saving conveyor.

Elevators should not wait for loads; fork-lift trucks should not wait for an elevator. Provide loading space near the elevator so that loads can be accumulated, then loaded on the elevator by equipment such as a jack-lift.

Base elevator use on a complete survey of materials handling. Minimize floor-to-floor, point-to-point, handling time. The elevator operator is an integral part of the entire materials handling problem. Be sure he understands the function of the elevator in the overall plan.

Install roller conveyors permanently or temporarily on the elevator car floor, so that loads can be pushed on or off. Place roller conveyors in loading and unloading areas so that loads can be accumulated and easily rolled into the elevator.

Over-head-monorails can be tied in with the elevator by short sections of monorail attached to the car roof and connected by switch to the main systems.

Use trailers that can be towed or pushed on the elevator by power truck.

Build special wheeled dollies to carry standard sub-assemblies to and from elevator.

Make better use of palletized loads to get capacity loads on each trip.

Use bins, shelf trucks and other containers on wheels, rollers and casters to get capacity loads quickly and easily.

Install faster-opening, bi-parting, power-operated doors. Power operation will further cut time lost; doors can safely begin to open as the elevator approaches the landing so that the load can be handled as soon as the elevator stops.

Where elevator has door at one end only, consider putting a door at the other end, thus providing a choice of loading areas. Save handling time by loading each end simultaneously.

Where several elevators are used in a bank, co-ordinate them by telephones in each car and at each landing connected to a central dispatcher, or by automatic dispatching system.

Equip your elevator for self-leveling. Loads can be handled more quickly and safely if the elevator is always level with the floor.

Install automatic controls to speed

# Handclasp of a friend-in-need

There's confidence in the very "feel" of the world famous C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers. The quick-acting "Squeez-Grip" fits your hand naturally like a handclasp ... hangs right ... carries right ... works right. You're in complete command of the situation instantly ... no fumbling ... no fatigue.

From the non-conducting, shatterproof discharge horn to the high strength, durably finished cylinder, you get top quality construction that results in a lifetime of satisfactory service. Because of the very few working parts and corrosion resistant materials throughout, the total cost to you over the years is less than other initially lower priced makes ... fire after fire, recharge after recharge, without trouble.

It's not hard to see, when you fully compare and try, why C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers are your best buy for killing flammable liquid and electrical fires, as well as some surface fires involving ordinary combustible materials. Sizes range all the way from 2½ to 100 pounds capacity ... all fully approved by the Underwriters' Laboratories, Inc., Factory Mutual Laboratories, Armed Forces and Government Bureaus.

With C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers the penetrating carbon dioxide is a clean, dry, non-damaging, non-conducting, inert gas ... smothers fire instantly, leaves no after fire mess ... harmless to equipment, materials and finishes ... even food is still perfectly edible.

Act now for complete free information on these first-rate, sure-acting fire extinguishers. Remember fire doesn't wait ... get the facts today!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

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*Sales and Service in the Principal Cities of United States and Canada*

AFFILIATED WITH PYRENE MANUFACTURING COMPANY

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# Here's how to store more power in the same battery space!

Your trucks will have more power, work stronger and last longer, when equipped with C & D Slyver-Clad* industrial truck batteries.

Ten years ago, C & D pioneered the Five-Fold method of insulation and retention to hold the active material in place on the positive grid and to practically eliminate sedimentation. This reduced size of the sediment space and allowed the use of longer and heavier plates. In C & D Slyver-Clad batteries, you get 20% more capacity—*in the same-size tray!* And, because "shedding" is also virtually eliminated, a C & D Slyver-Clad Battery lasts longer and delivers maximum capacity at the very end of its life. The next time you replace an industrial truck battery—*install more power in the same space*—install C & D!

*TM Reg.

**WRITE FOR SPECIFICATIONS!**

For complete descriptions and specifications of C & D Slyver-Clad Industrial Truck Batteries, write for Bulletins IT-517 and IT-518.

C&D

BATTERIES, INC.

of Philadelphia, Pa.

Manufacturers of Industrial Batteries since 1906

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

For more facts circle 548 on Reply Card


# OPERATION & PRODUCTION

(O and P begins on page 52)

service and reduce costs of running the elevator.

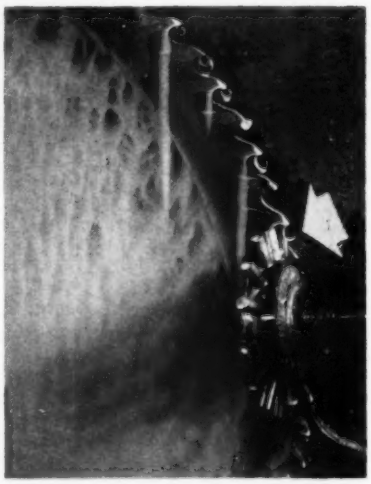
Use push-buttons on pendant fixtures so that power-truck operator can call elevator without dismounting.

Take advantage of gravity for down-flow. Other types of conveyors such as spiral chutes will relieve some of the "down" traffic on the elevator.

Determine whether light, frequent loads causing an elevator bottleneck can be carried by a dumbwaiter or a small auxiliary elevator. Heavy personnel traffic, if a problem, may be carried on escalators or by self-service passenger elevators.

Many older plants consist of a series of buildings erected at different times over the years. Different building heights and floor levels may cause transportation problems. An elevator with doors at each end can be installed between separate buildings to facilitate transfer of materials from one to the other.

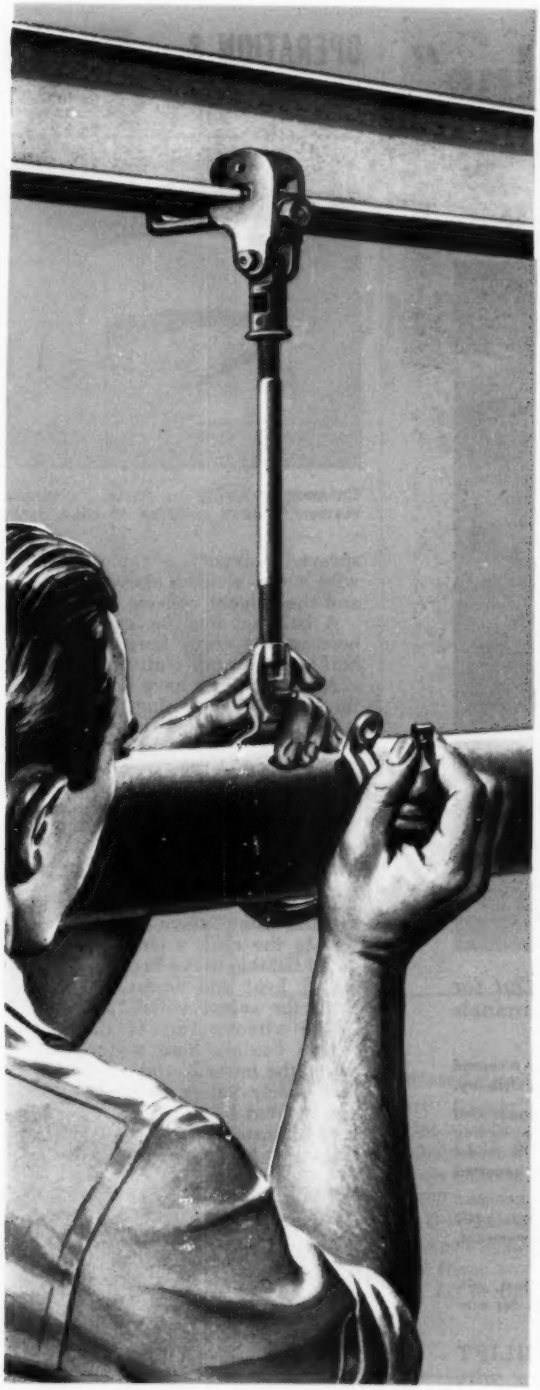
## Billet Saw Drives Cleaning Wheel



**Stainless steel billet saw-off operation at Gary plant of National Tube Co. uses free-running spoked wheel to clean chips from saw blade. Saw blade rotation drives cleaning wheel in right-angle gear action as teeth hit spokes**

## Cleaning Station Stores Solvent

To OVERCOME evaporation losses that were occurring during spray cleaning of small electrical parts, one U. S. Naval station uses a modified metal drum as a spray cleaning station. The drum is fitted with a cone, welded into the upper half, with a 3-in. diameter drain hole in its center. Parts to be cleaned (using



# Right for the job and priced right!

There's nothing sensationally "tricky" about this pipe hanger. It's just the most practical and inexpensive way of hanging pipe for a great many jobs. Complete assembly includes a split pipe ring and socket, rod, extension piece and universal I-beam clamp. Available for pipe from ½" to 8", for loads from 75 to 1510 lbs.

It is well worth remembering that a good piping job is too important to jeopardize with improvised or inadequate pipe hangers and supports. You can get from Grinnell just the right pipe hanger for any job within the shortest possible time at the lowest cost consistent with quality.

Grinnell has the most complete line of pipe hangers, extensive manufacturing facilities, warehouses across the country, and jobbers in almost every city and town.

**UNIVERSAL SIDE I-BEAM MALLEABLE IRON CLAMP (Fig. 225)** . . . Used on American Standard I-beams as well as wide flange beam sections. One of 14 different Grinnell beam clamps to meet varying specifications.

**MALLEABLE IRON EXTENSION PIECE (Fig. 157)** . . . Bolts into Universal Side I-beam Clamp (Fig. 225) and other malleable iron clamps to receive hanger rod. Provides for adjustment of rod.

**MALLEABLE IRON SPLIT PIPE RING AND SOCKET (Fig. 107R)** . . . Once hanger rod is turned to proper adjustment and the attached half of the ring is snugged against the pipe, the other half of the ring is swung up into position and bolted. For 13 pipe sizes, ½" to 8", for loads from 75 to 1510 lbs.

# GRINNELL

**WHENEVER PIPING IS INVOLVED**

**Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors**

**Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems**

**For more facts circle 549 on Reply Card**

# MOBILIFT "Stand-Ups" *Stand Out!*

MOBILIFT *Stand-Up* type Fork Lift Trucks *Stand Out* for efficient, low-cost materials handling in warehouses, terminals and plants because they get more work done faster.

**Here's Why:**

1. The operator gets on and off an ample size platform in a second or two. He works on his feet, has maximum all-around visibility.
2. MOBILIFTS are agile. Compact design, short over-all length, and MOBILIFT 360° steering mechanism makes ZERO inner turning radius and 57" outer turning radius possible (2,000 lb. model "E"). MOBILIFTS are long-time favorites for close, congested working areas.
3. LEV-R-MATIC push-pull controls speed all movements. NO GEARS TO SHIFT... push-pull levers for forward-back movement, elevating and tilting.
4. MOBILIFT air-cooled 3-cylinder engine delivers abundant, reliable power. Compact, precision-balanced, accessible for economical operation with minimum repair and service.

Let a MOBILIFT Sales Engineer show you why MOBILIFT *Stand-Ups* in your business will *Stand Out!* Write or wire MOBILIFT for complete information today. *No obligation,*

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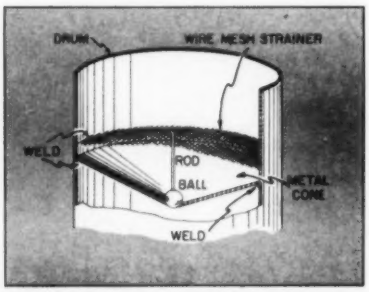
## OPERATION & PRODUCTION

(O and P begins on page 52)




Cutaway drawing of drum "cleaning station" shows position of cone, mesh

sprayed solvent) are placed on a wire mesh welded above the cone, and the solvent collects in the cone.

A ball, set into the center of the hole in the cone, keeps the lower half of the drum relatively air-tight.

After the parts have been cleaned, the ball is lifted, using the rod protruding through the wire mesh, and the solvent is allowed to drain into the bottom of the drum. Here, it can be stored with a minimum loss through evaporation.

### Metal Hose Quiets Pop Valves

ATTACHED between the outlet of a boiler safety valve and its exhaust line to the roof, a length of corrugated flexible metal hose absorbs the sound, heat and vibration resulting from the safety valve "pop."

The absorption of the sound in the flexible hose materially reduces the hazards and noise of popping safety valves to a level that is appreciated by the workers, and in many instances, by neighboring residents in the plant area.

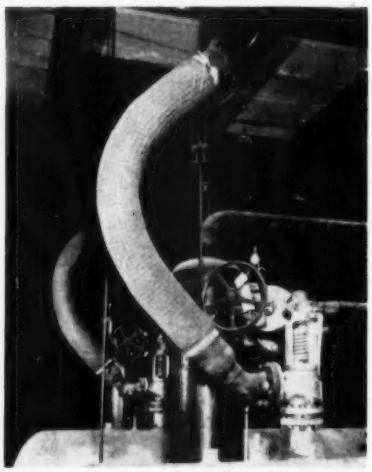


Photo: Flexonics Corp.

Flexible metal hose clamped between safety valve and exhaust stops noise

*1953 Headquarters for*

# LOW VOLTAGE CIRCUIT BREAKERS

*is your*

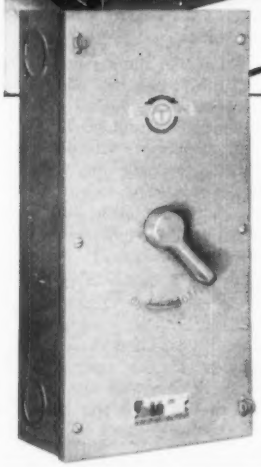
# TRUMBULL (T) DISTRIBUTOR

Superior design and construction features enabled Trumbull to develop circuit breakers that withstand the moisture, high-shock, and vibration of shipboard service required by the U. S. Navy. These same basic features enable your Trumbull Distributor to meet your *specific* needs from Trumbull's *complete* line.

Trumbull Circuit Breakers for load centers, panelboards, switchboards, for industrial, commercial and residential applications, provide greater safety to operators, better circuit protection against both shorts and sustained overloads. They pay off in convenience, permanence and fast restoration of service.

Available in ratings from 10 to 600 amperes and voltages up to 600 volt AC, 250 volt DC, either open type or with surface or flush-mounted enclosures, of semi-dust-tight, water- and dust-tight design. Accessories available for conversion to non-automatic, remote tripping, bell alarm and other special requirements.

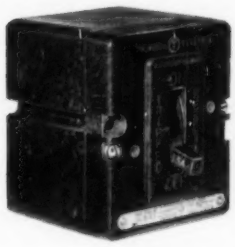
Trumbull Circuit Breakers and breaker-equipped load centers, panelboards and switchboards, plus the advice of qualified Trumbull sales engineers, are available through leading Distributors everywhere. Write direct for literature or technical information.



**Trumbull AT enclosed circuit breakers** feature "trigger" trip, automatic tripping, silver-alloy contacts, individual calibration. 2- and 3-pole construction, from 15 to 600 amperes, 125 to 600 volt AC or 125 to 250 volt DC. Single pole available in 50-ampere frame size breakers, 125 volt AC or DC.

**Trumbull TQL (plug-in) and TQ Circuit Breakers** feature *both* thermal and magnetic protection, "trigger-type" quick-make and break, trip-free operation, trip-indicating handle, silver-plated contacts, arc-quenching chamber. Individually calibrated and sealed in compact, dead front phenolic cases. Ratings: 10 to 50 amperes, 120 volt AC, single pole.

TYPE TQL TYPE TQ



**Trumbull K-173 Marine Hi-Shock Circuit Breakers,** 3-pole, 125 volt AC or DC, 50 ampere frame size. Suitable for protection of lighting mains, feeder circuits, single load circuits supplying motors, radar, sonar, etc.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
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For more facts circle 551 on Reply Card

ABOVE: Vital to the high production maintained by Gunnison Homes, Inc. is this 650-ton hydraulic press used to bond plywood panels into strong, durable wall sections.

LEFT: Handsome, precision built homes, like the Gunnison Coronado pictured here, are built in a matter of hours.

## Answers a pressing need for Gunnison Homes, Inc....

● Gunnison Homes, Inc., situated in New Albany, Indiana, is one of the leaders in the field of manufactured homes. Key to continuous production of precision built homes at the New Albany plant is the 650-ton hydraulic press, shown above, which was installed in 1947. This press processes ten plywood panels every cycle by the combination of heat and pressure . . . a tough job and one requiring reliable hydraulic performance to maintain production schedules.

STANOIL Industrial Oil was installed in the press when it was put into operation six years ago. STANOIL has stood the test of severe operation . . . with no evidence of oil deterioration being found during a recent inspection of the hydraulic system. Operation has been efficient. Minimum make-up oil has been needed to maintain the oil capacity of 450 gallons.

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**Industrial Oil**

Find how STANOIL can benefit you by discussing this multi-purpose oil with a Standard lubrication specialist. You can contact him by phoning your local Standard Oil office. Or, write: Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

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**Ralph E. Murnahan,** of Standard Oil's Evansville office, is the lubrication specialist who keeps in constant contact with Gunnison Homes to make certain that there is no interruption of operation due to lubrication difficulties.

He is one of many lubrication specialists who make their headquarters in Standard's offices throughout the Midwest. These men have been specially trained in Standard's Lubrication Engineering Schools and, in addition, have a wealth of on-the-job experience.

To obtain the service of the lubrication specialist in your area, you need only call your local Standard Oil office. The lubrication specialist will discuss your lubrication problems with you . . . at no obligation to you, of course. He has a complete line of petroleum products to offer you, including:

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**STANOLITH Greases**—Because these unique lithium soap products possess the heat resistant properties of soda-soap greases and the water resistant properties of lime-soap greases, they offer a solution to lubrication problems caused by the presence of both heat and water.

**STANDARD OIL COMPANY** STANDARD *(Indiana)*

# CONSTRUCTION BRIEFS —a review of fundamentals for the plant engineer

*Prepared by Byron A. Engelbach, Plant Engineer*

CERTAIN ELEMENTARY principles of design apply to all structural members falling within the classification of beams. The term beam used in a broad sense is applicable to any structural member located in a generally horizontal position and supported to carry superimposed transverse loads. Refer to Fig. 1.

Floor joists are beams of small size, closely spaced, designed as flooring supports. Flooring, irrespective of material of composition, acts as a beam which spans the supporting structural members. The girder, designed for long spans and heavy loading imposed by smaller secondary beams is a beam. Generally the section of a girder is "built-up" by a combination of several structural shapes, mechanically joined together to form a structurally integral unit. It is common practice to refer to any large beam designed for long spans and heavy loading as a girder, Fig. 2 and Fig. 3 illustrate clearly the similarity in basic fundamentals of these different structural members.

The materials of which a beam is composed have no relation to the theory of beams, and may be entirely discounted in the elementary principals of design. However, in order to comprehensively illustrate these principals, it will be necessary to actually apply them to beams of wood or steel.

Prior to the actual calculations involved in the selection of specific materials, shapes and sizes of structural beams, it is first essential that there is a complete understanding of the laws of the action of forces. Force, in this instance, refers directly to the loads superimposed on the structural members. Loads on beams, their location, type and angle of action, tend to set up stresses within the beam or on other structural members which greatly influence the material, size and shape of the beams which are finally selected.

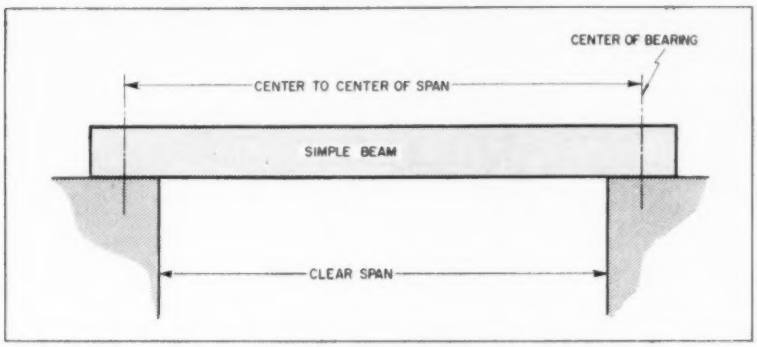


Fig. 1. Basic arrangement of structural members to satisfy theory of beams

**Plant Engineering presents the first in a series of Construction Briefs, that will become a regular department of the magazine, alternating bi-monthly with an Industrial Legal Department, both intended as ready-reference sources for the plant engineer.**

**These sheets have been marked for insertion in a looseleaf folder, for easy-to-find filing. Additional copies are available upon request to the Editors.**

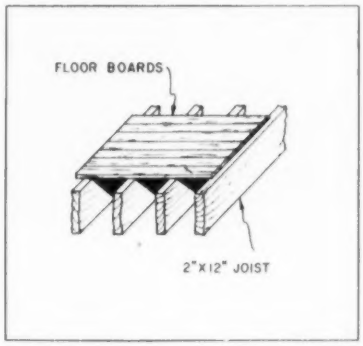


Fig. 2. Floor joists are small beams

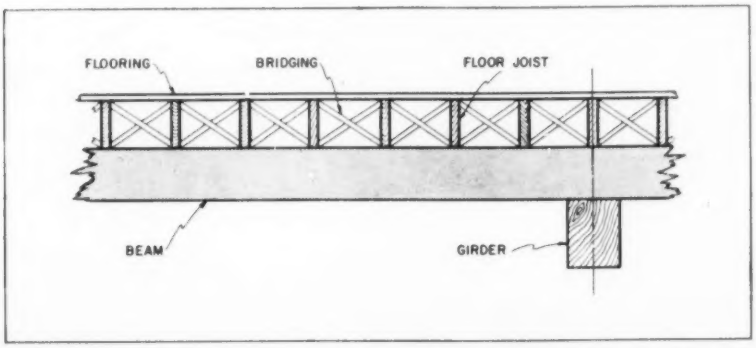


Fig. 3. Flooring structure, made up of several members, still functions as beam

## Beam Stresses

**Reaction** In the case of a simple beam supported at both ends, it is obvious that each support exerts a counteracting force against the weight of the beam and its superimposed loads. These counteracting forces are called end reactions. Depending on the loading of the beam, the reactions may be determined by observation or, as is usually the case, may require a knowledge of methods for determining the results mathematically. Fig. 4 illustrates this particular stress. Assuming a beam supports a 12,000 lb concentrated load at the center of the span, it is clear that reactions R-1 and R-2 will be one half the total load or 6000 lb each. The weight of the beam itself has been disregarded in this instance. Should the load be placed other than absolute center, the end reactions would differ from those shown.

**Shear** The loads and the end reactions of the supports tend to cut the beam across its vertical section and these stresses produced within the beam are referred to as shearing stresses. In simple beam calculations the shear at the supports is equal to the reactions and the shear at any point between the supports equals the reaction minus the total load between the supports and the point of investigation. A study of Fig. 4 will show that if we consider the weight of the superimposed load as being vertically downward due to gravity and the counteracting force supporting the load at the point of reaction or R-1, then there is a defi-

nite shearing stress vertically across the beam at this point. Since there is no load to be considered in this case other than the concentrated 12,000 lb, then the total shear on the left hand side of the beam will be 6000 lb from the end to a distance of 10 ft to the right or directly under the load where the shear will drop to zero, in accordance with the definition.

**Bending Moment** The load on the beam tends to produce a bending or deflection of the beam. The bending moment is a measure of the tendencies of the forces to cause the failure of the beam by bending or flexure. The external forces which tend to cause a beam to bend are the downward loads and the upward reactions. Each acts with a leverage or moment arm which is the perpendicular distance from its line of action to the point at which the beam tends to break. The algebraic sum of these external forces is called the bending moment and is expressed in terms of ft-lb or in.-lb. This subject will be investigated in detail in later Briefs.

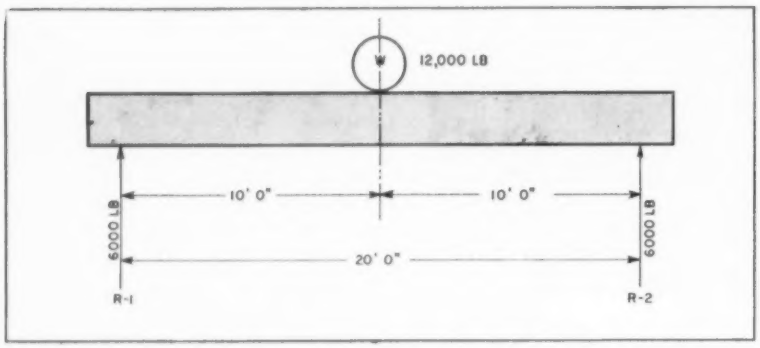


Fig. 4. Concentrated load bearing on beam creates shearing stress at supports

**Lateral Deflection** The tensile stresses (resistance to shear) within a beam tend to hold the beam in a straight line between the supports, while the compressive stresses tend to deflect it in a lateral direction. On long spans, not laterally braced to prevent sidewise deflection, a choice of section may need special investigation due to this reaction referred to as lateral deflection. Fig. 5 illustrates an exaggerated condition of this stress. Lateral bracing or bridging as shown in Fig. 3 corrects this condition.

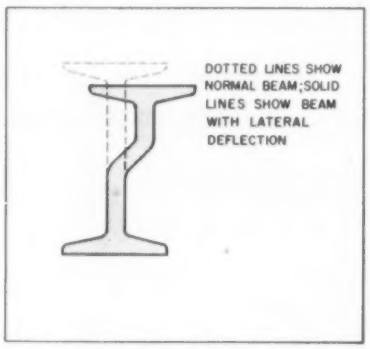


Fig. 5. Lateral deflection of I-beam

**Vertical Deflection** Bending of a structural member caused by the loading is referred to as vertical deflection, which is a measure of the deformation of the beam from a normal straight line. In some instances, the limit of allowable deflection may determine the choice of a section, since too great a deflection might possibly result in damage to other materials in contact with the member. See Fig. 6 for vertical deflection.

**Tension** Tension is that stress which resists the tendency of two forces acting in opposite direction and pulling apart two adjoining planes of a body.

**Compression** Compression is the opposite of tension in that it is the stress which resists the crushing action of two forces acting in opposition and towards each other.

**Torsion** Torsion is the stress that resists the forces tending to twist a body.

**Combined Stresses** Parts of structures are often acted upon by several external forces resulting in the development of stresses of a combined nature, such as flexure and tension, flexure and compression.

In general, all external forces which act on a structure causing internal stresses in structural members are termed loads: The *Dead load* which includes the weight of the structure and all fixed appurtenances; the *Live load* which covers such types as furniture, movable objects, and moving objects.

Dead loads are fixed loads and are always present and always act in a vertical direction due to the pull of gravity. Such loads are gradually built up to their maximum and are assumed to be permanent.

Live load, as a term, applies to all forces or loads which are effective and acting at times and at other times may not be present or only partially in effect. Wind loads and snow loads even when identified separately are generally considered under the general term live loads. It is interesting to note that movable loads such as trains or automobiles and trucks set up excessive vibrations within a structure and set up stresses which are accepted to be twice as great in intensity as normal loads.

Loading on beams may be either uniform or concentrated or a combination of both. A uniform load is that load which is distributed uniformly or spread evenly over the beam. The weight of the beam itself is such a load, or the load imposed by a supported wall. Uniform loading is declared by the intensity per unit of length of the beam usually expressed in pounds per linear foot of beam. A concentrated load is a simple applied weight such as a column or the load applied by the end reaction of another beam.

When the principals of structural mechanics are applied to determine what materials, size and shape of beam should be used to safely withstand the action of forces (i.e., the superimposed loads under specified conditions of loading) it is necessary to first find what effects are produced on the structure by the loads; secondly, to determine what unit strength must be resisted by the material in the beam; and thirdly, to determine a section modulus quantity from which the proper beam may be determined whose section modulus will equal or better the quantity found.

All beams must be designed to support their own weight plus the calculated or known imposed loading without failure and also within certain fixed limits of flexure.

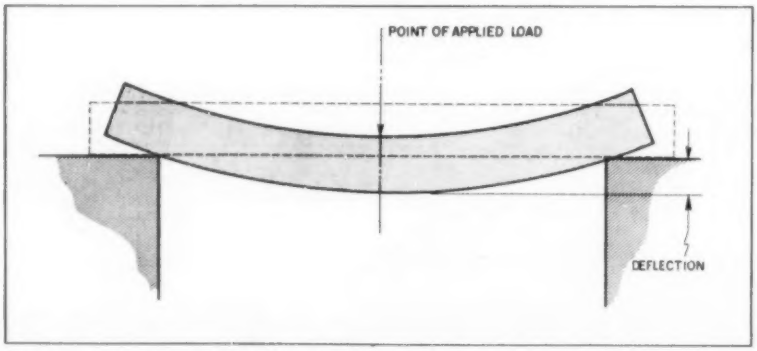


Fig. 6. Application of load results in bending, measured as vertical deflection

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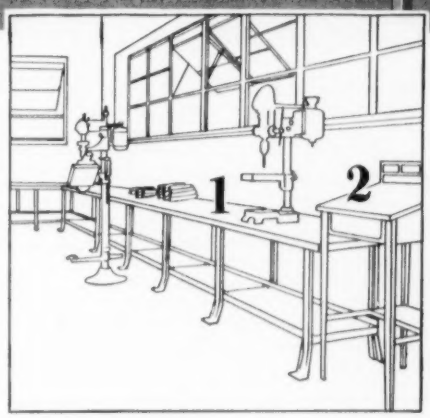


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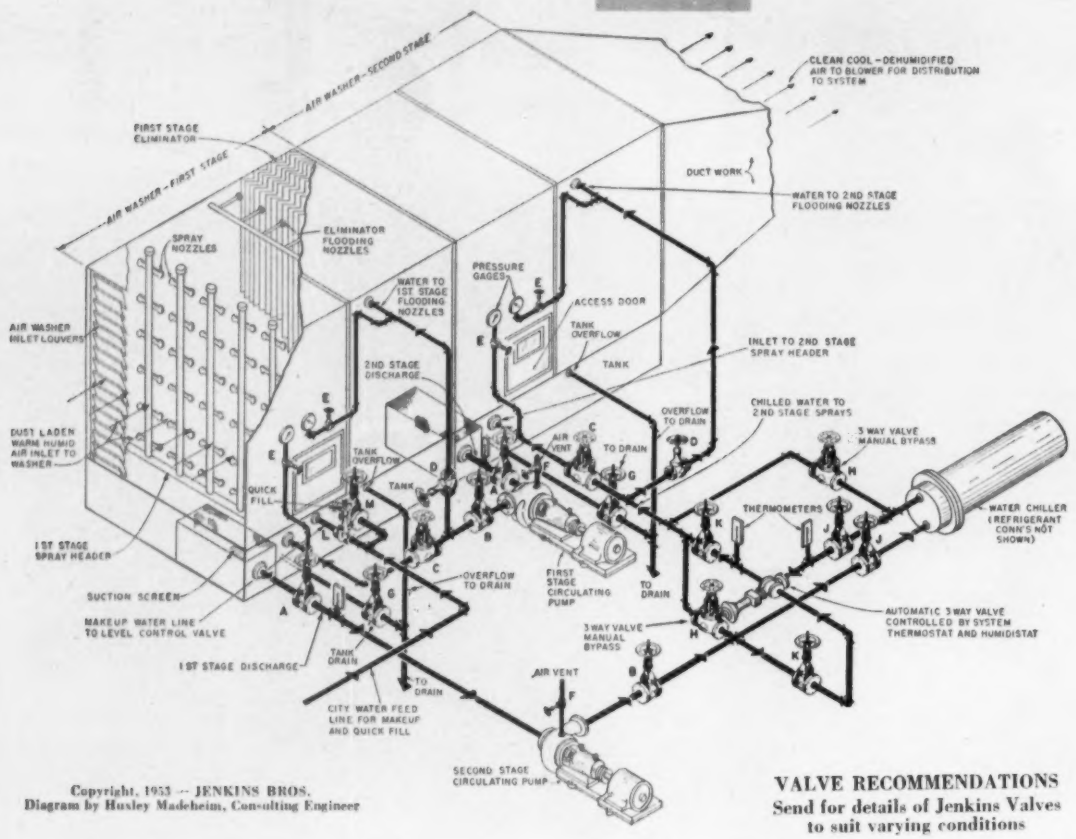
# JENKINS PRACTICAL PIPING LAYOUTS 66

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## *How to plan* PIPING CONNECTIONS FOR AN AIR-WASHER AIR CONDITIONING SYSTEM

**The air washer** air conditioning system illustrated is a two-stage installation designed to cool, dehumidify and clean air for non-industrial (comfort) purposes.

**Water from a chiller,** sprayed through second-stage nozzles, picks up heat from the air stream. This water is collected at the bottom of the tank and, still at a temperature below the dew-point of the entering air-stream, is sprayed through the nozzles of the first stage. Here, too, it cools and dehumidifies the air. The water is then pumped back through the chiller and the cycle is repeated.

**Excess moisture** is removed between stages by a series of baffles which set up abrupt directional changes in the air flow, causing any droplets of water suspended in the air stream to drop out. Separate water spray keeps the baffles wet to collect dust and dirt from the air stream. Final air condition is automatically controlled by proportionate mixing of chilled and return water by means of a three way valve.

**Consultation** with accredited piping engineers and contractors is recommended when planning any major piping installation.

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering experience, select all the valves you need from the complete Jenkins line. It's your best assurance of *lowest cost in the long run.* Jenkins Bros., 100 Park Ave., New York 17.

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| C | 2 | Fig. 142, I.B.B.M. Globe | Spray Header Control |
| D | 2 | Fig. 956, Bronze Globe | Flooding Nozzle Control |
| E | 4 | Fig. 741-G, Bronze Needle | Pressure Gage Control |
| F | 2 | Fig. 741-G, Bronze Needle | Pump Air Vents |
| G | 2 | Fig. 651-A, I.B.B.M. Gate | Tank Drains |
| H | 2 | Fig. 142, I.B.B.M. Globe | 3 Way Valve Manual By-Pass |
| J | 2 | Fig. 651-A, I.B.B.M. Gate | Water Chiller Shutoff |
| K | 2 | Fig. 651-A, I.B.B.M. Gate | 3 Way Valve Shutoff |
| L | 2 | Fig. 47, Bronze Gate | Feed to Level Control |
| M | 1 | Fig. 651-A, I.B.B.M. Gate | Tank Fill Valve for Start up |

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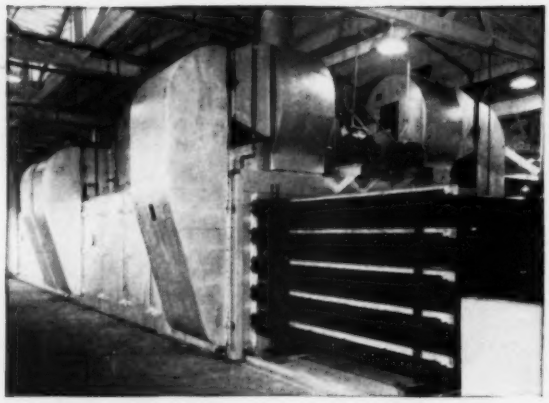

Coe Veneer Dryer. Welded coils with TUBE-TURN Welding Returns are compact and permanently tight.

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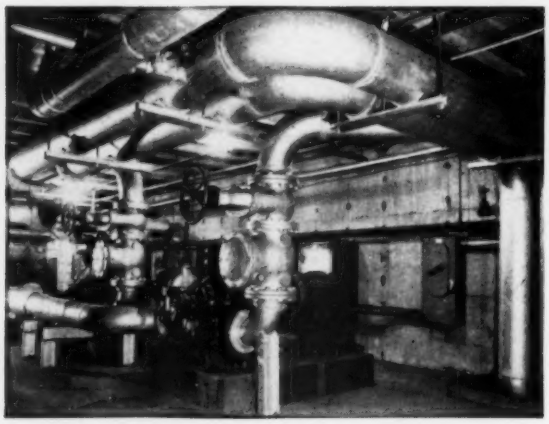

**COMPACT.** Welded piping nests together . . . saves space. These condenser lines are for air conditioning system at Lazarus Department Store, Columbus, Ohio.

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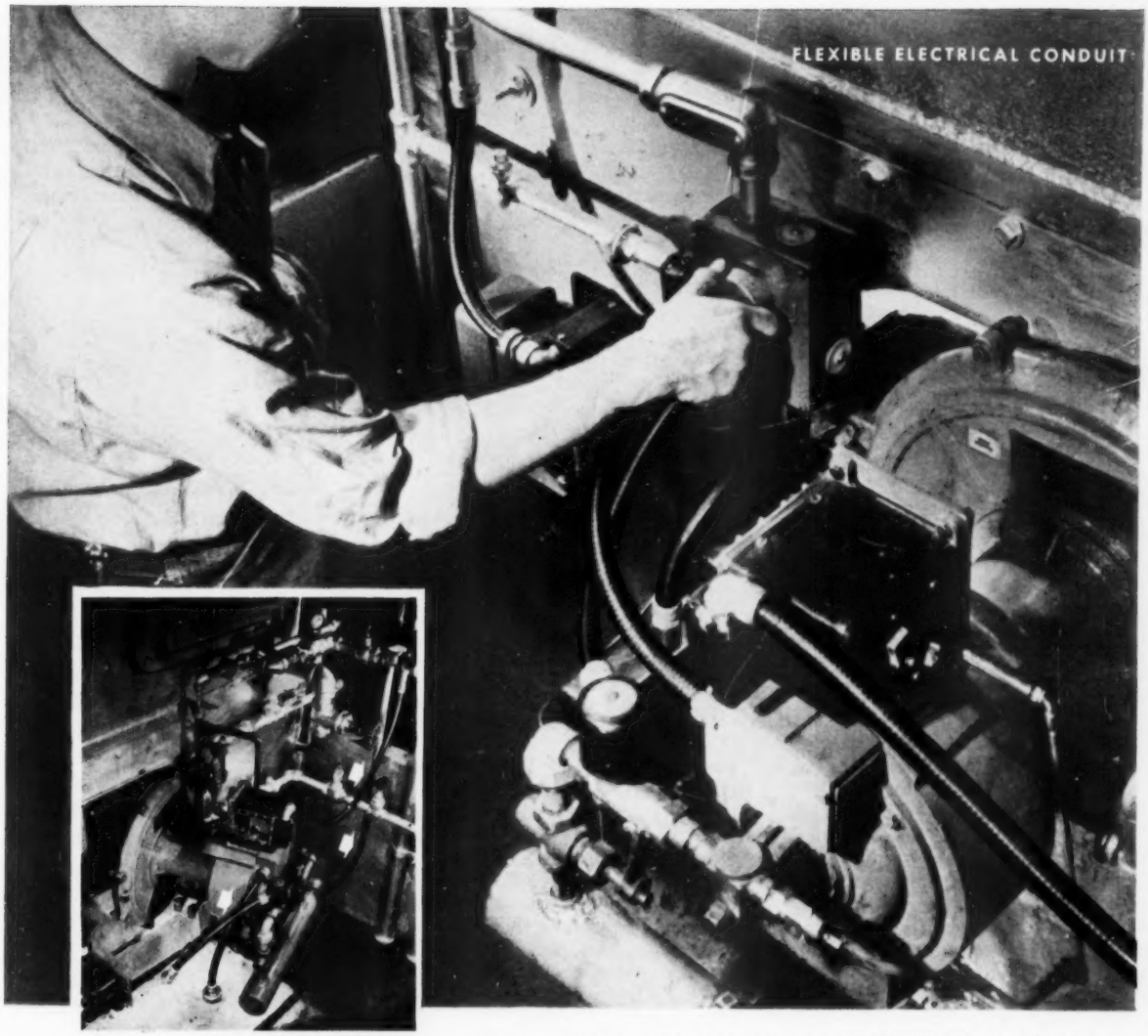


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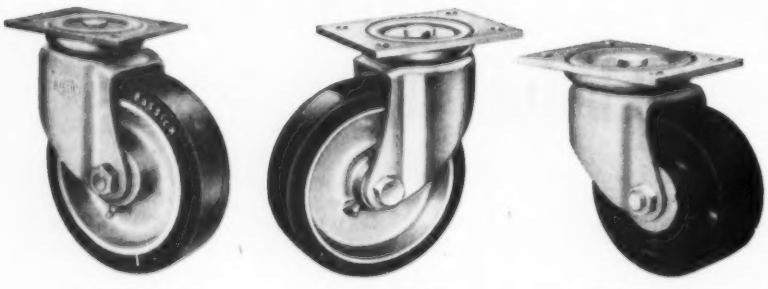
## Are WALLFLOWER trucks costing you money?

If you're looking for ways to cut operating costs (and who isn't?), here's one that's often overlooked.

Check your rolling stock—dollies, hand trucks, portable equipment, etc.—and see whether you haven't got a few "wallflowers" that nobody wants to use. You'd be surprised how often equipment that seems to be in good shape stands on the sidelines because inefficient casters make them unpopular with workmen. Since they're hard to move, they get the cold shoulder in favor of equipment that rolls easily and smoothly. And it's no news that idle equipment wastes money fast.

You can make the "wallflowers" carry their full share of the load simply by equipping them with efficient Bassick casters. Why not try Bassick casters on one of your idle trucks? Then watch how quickly it goes to work for you.

## Put them back in ACTION with these Bassick Casters



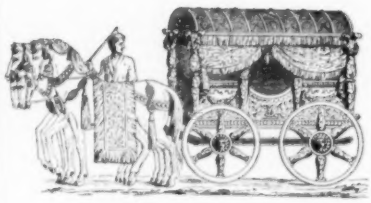
SERIES "L99" SERIES "H99" SERIES "S99"

These rugged Bassick truck casters make any floor an "Easy Street" for portable equipment. Built to give easier handling and longer life, they come in sizes from 3" to 10", with all types of wheels, have fully hardened raceways.

There's a Bassick industrial caster distributor in your neighborhood who stocks the right size and type of caster for anything from teatables to ten-ton trucks.

**For more facts circle 557 on Reply Card**

## *Why Roman roads are arrow-straight*



Engineers who marvel at the enduring construction of the old Roman roads sometimes conclude that they're straight as an arrow because that's the best way to build military vehicular highways in a hurry. Some historians offer another explanation. They think these roads are straight because the Romans hadn't discovered the trick of swiveling the wheels of their 4-wheeled carts. Naturally these had a hard time getting around corners, while the famous Roman chariots simply skidded around on their two wheels.

This may also explain why the Romans built so many 2-wheeled state coaches when you'd expect them to have four wheels. An exception is the ornate carriage shown above, which is of uncertain date.

Good casters do not need straight roads. They provide the flexibility so important in materials handling to move any equipment immediately in any direction. Put your loads on Bassick Casters and save precious time and labor. Bassick has the right caster for the job.

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H-21 TRANSPORT HELICOPTER

# MONORAIL *Gives Helicopter* FIRST LIFT

## AMERICAN MONORAIL CRANES HELP ASSEMBLE THE FAMOUS PIASECKI H-21 WORKHORSE

Covering over 600,000 square feet of operating area in the Piasecki plant, American MonoRail Cranes aid in the assembly of these remarkably efficient helicopters. Overhead handling assures safe and accurate movement of parts into assembly with maximum speed. American MonoRail engineers are experienced in all phases of "up and over" handling. They are available for free consultation at your convenience.

*Write for our C-1 Bulletin.*

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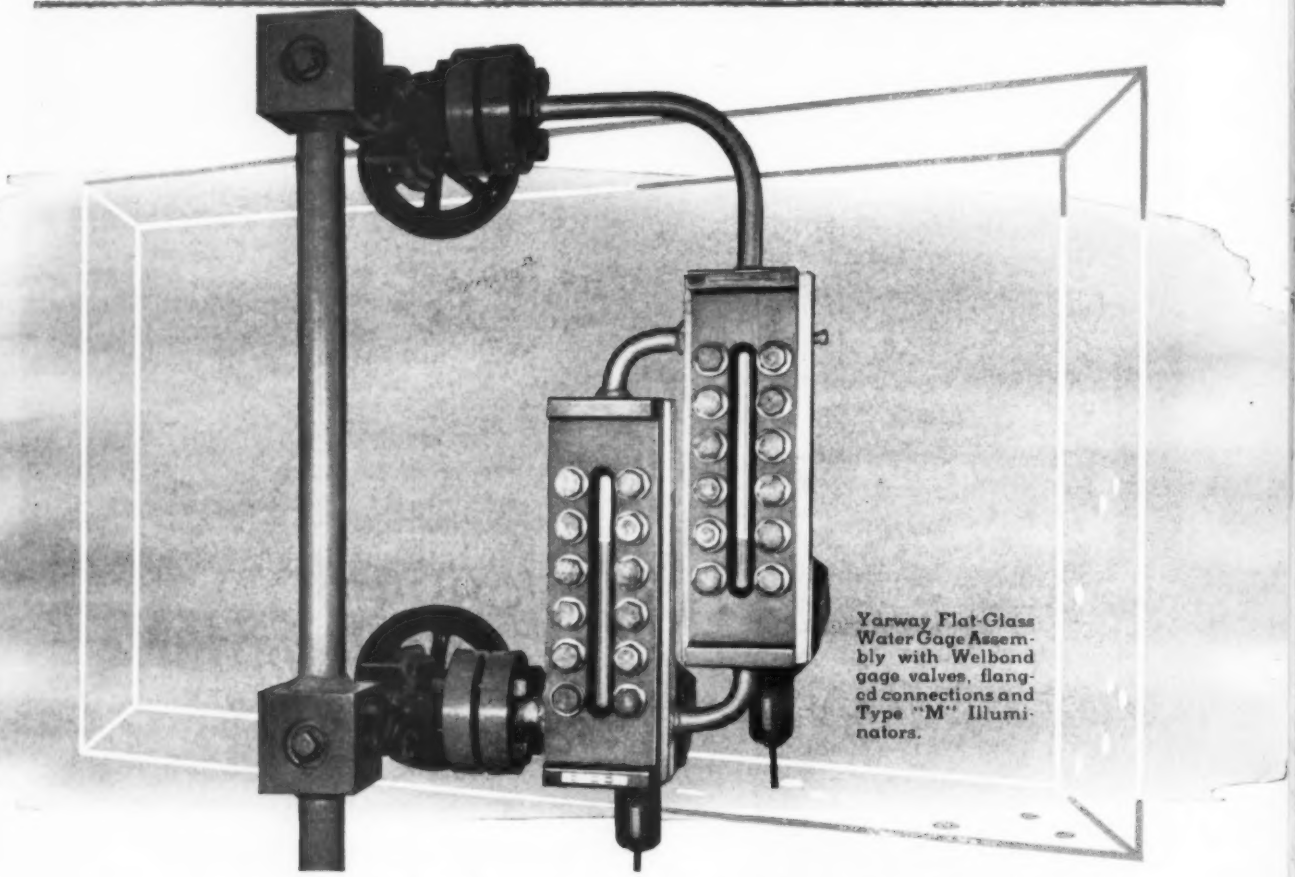
# *What's New*

# IN BOILER WATER LEVEL INDICATION?



Yarway Flat-Glass Water Gage Assembly with Welbond gage valves, flanged connections and Type "M" Illuminators.

## NEW *SEPARATED-DESIGN* WATER GAGES

This new Yarway water gage assembly has been developed to meet the demands for greater dependability, longer life, and more accurate readings in high pressure service.

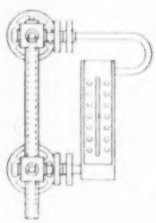
The gage glass inserts are of the Yarway pressure-sealed "floating assembly type". Yarway Welbond gage valves are used. Greater flexibility is gained by using two independent inserts, and by interconnecting expansion loops (see above).

The short connection to the drum assures greater accuracy of the gage reading, and the lower flanged connection eliminates a stuffing box. The upper flanged loop connection between the insert and gage valve allows expansion and contraction of the various components.

The tie bar-type water column linking the gage valves provides circulation to keep gage nearer drum temperature.

Yarway Type "M" Illuminators on the gage inserts cause the meniscus at water level to "shine like a star". This illuminator is especially effective in penetrating deposits on gage glass, dust particles in air and extraneous light.

For full information, write for Yarway Bulletin WG-1811.



Yarway Single Insert type gage for medium range of visibilities.

**YARNALL-WARING COMPANY** • 145 Mermaid Ave., Philadelphia 18, Pa.

**YARWAY** **STEAM PLANT EQUIPMENT**

# ELECTRIC POWER
## For Laboratories and Testing

Equipment needed for obtaining high frequency power . . . Comparisons of cost and reliability of service . . . What equipment gives greatest ranges of frequencies . . . Types of controls . . . What information is needed by the manufacturer when you specify motor generator sets

By LEO G. SANDS, Bogue Electric Manufacturing Company

ELECTRIC POWER, differing in character or quality from available utility power, is often required in laboratories and in production plants for operating and testing electrical and electronic equipment.

Power, normally available from utility mains, is usually 60 cycle single or three phase alternating current at 120, 208, 220 or 440 volts. Other voltages are easily derived through the use of suitable transformers. In some cities, direct current is available, particularly in districts which have not been converted to alternating current.

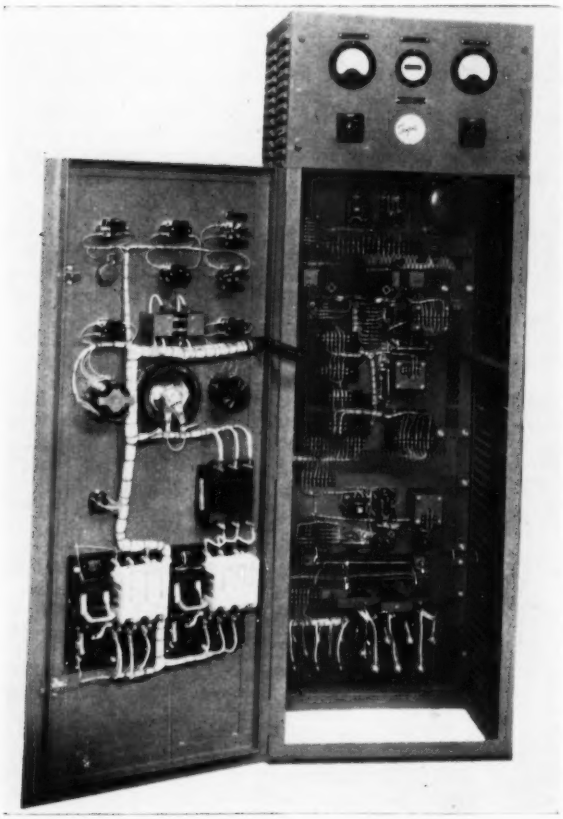
The electronics manufacturer is often confronted with a need for high frequency alternating current at 400 cycles, 800 cycles or higher to permit testing and operating airborne and marine equipment. The need for direct current is also required for similar apparatus.

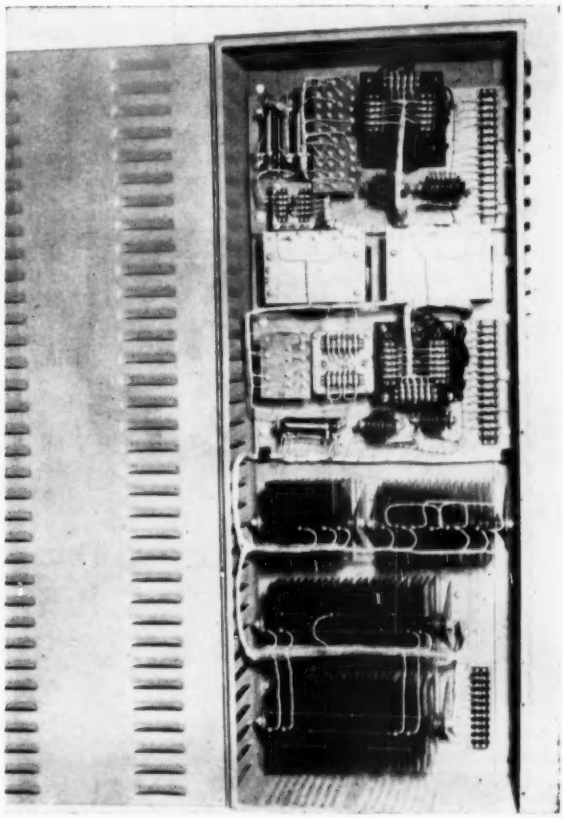
A large number of manufacturing plants and laboratories have installed motor generator sets to convert utility power to 400 cycle or other high frequency power. Many types of motor generator sets have been sold for this purpose.

Perhaps the cheapest way to obtain 400 or 800 cycle power is to use a surplus airborne inverter operated from a 28 volt direct current source, such as a storage battery floated across a battery charger. This arrangement will provide a limited amount of high frequency power.

However, the use of an airborne inverter in stationary applications presents certain limitations and disadvantages. As the inverter is necessarily driven from a direct current power source, a battery and charger or a rectifier are required. The output of the typical inverter is limited to a few hundred watts and its wave

At left, control cubicle for 400 cycle motor generator set. Cubicle contains motor starter, overload protectors, undervoltage alarm and magnetic amplifier voltage regulator. At right, magnetic amplifier regulated rectifier power supply





form, voltage and frequency regulation are usually poor. Because the inverter was designed for airborne application, it operates at very high speeds in the order of 8000 rpm to keep its weight down. Furthermore, it was designed to be operated for a few hours at a time and not for continuous day in and day out service as in the laboratory or plant.

The airborne inverter is a fine machine for its intended application. For plant or laboratory use, however, a much slower speed motor generator set will provide greater reliability with less maintenance. This fact has been recognized by the Air Force and Navy, who use the larger, lower speed equipment for ground servicing of aircraft.

Two general types of 400 cycle motor generator sets are in popular use. The induction motor generator set consists of an alternator with direct connected exciter driven by a squirrel cage induction motor. The synchronous motor generator set is similar except it employs a synchronous motor for driving the alternator and exciter.

Induction motor generator sets are generally operated at 1725 rpm or 3450 rpm. At synchronous speed (1800 or 3600) the alternator frequency would be 420 cycles, but due to the slip it is usually about 410 cycles no load, dropping to about 400 cycles at full load.

The synchronous type sets usually run at 1200 rpm, with the alternator arranged to give 400 cycles. This remains constant from no load to full load, provided, of course, that the 60 cycle frequency of the power fed to the motor does not vary. The synchronous motor generator set operating at 1200 rpm is quieter and requires less maintenance.

The generator instead of being coupled directly to the motor is occasionally belt driven. This is used when it is necessary to compensate between motor and generator speeds to provide the desired frequency at the output of the generator. Such arrangements should be avoided whenever possible, particularly in the larger sizes.

When electrical power at various frequencies is required, a mechanical type of variable speed drive is sometimes used between motor and generator. The output frequency is controlled by adjusting the speed selector of the drive mechanism.

Another system, particularly indicated when the desired frequency range is large is the use of a variable speed direct current motor to drive the alternator. If direct current is not available, another motor generator set or rectifier unit will be required to provide power for the variable frequency motor generator set. When accurate control of the frequency is necessary, a magnetic amplifier speed controller may be used.

**MOTOR GENERATOR PRICE INQUIRY INFORMATION FORM**

Available input power:

_____ volts _____ cycles _____ phase

Output power required:

_____ watts _____ power factor

_____ volts _____ cycles _____ phase

If three phase state whether wye or delta connection, 3 or 4 wire._____

Voltage regulation required: ± _____ % no load to full load

Frequency regulation required: _____ cps to _____ cps no load to full load

Maximum total harmonic content allowable = _____% line to line

If DC output, maximum allowable ripple: _____% line to neutral

_____%

Duty cycle: On _____hours or minutes, Off _____hours or minutes

Operating Conditions: Temperature _____ °C max. _____°C min.

Humidity_____

Corrosive atmosphere or other_____

Space limitations_____

Type of enclosure required (Check one)

_____open _____drip proof _____splash proof _____explosion proof

CONTROLS Required: (Specify type or special conditions)

Motor Starter:_____

Meter: _____

Circuit breakers:_____

Other:_____

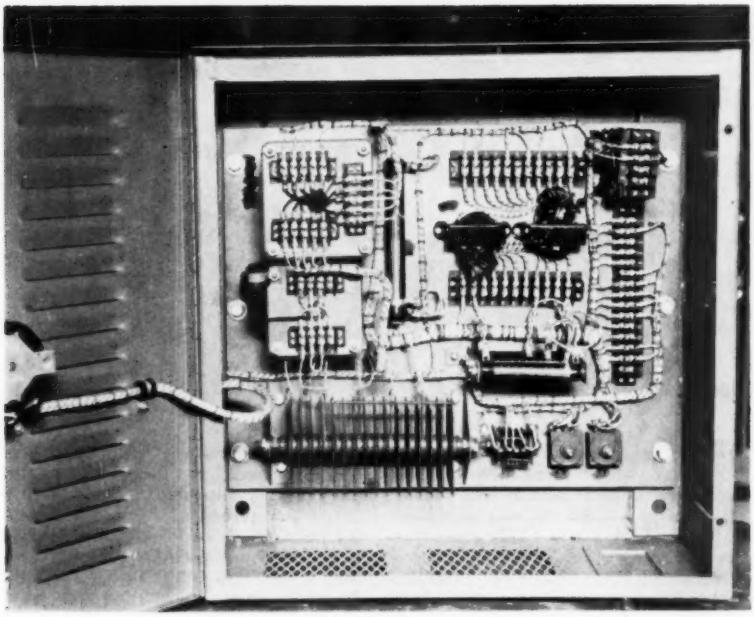
**Sufficient information should be supplied to the manufacturer when ordering. This sample price inquiry form will give needed information on motor generators**

The output voltage of a high frequency generator may be controlled by varying the field current of the alternator or the exciter. Automatic regulation of output voltage can be provided through the employment of a carbon pile, finger type, vibrating, electronic or magnetic amplifier regulator.

The carbon pile regulator is perhaps the most popular. It is simple, reliable and provides automatic regulation in the order of ± 2 per cent no load to full load. The finger-type regulator performs the same functions as a carbon pile regulator but uses a group of fixed resistors which are shunted by magnetically activated finger contacts in lieu of the carbon pile.

Electronic regulators can be designed to provide extremely good regulation when the utmost in reliability and freedom from shut down time is required, the magnetic amplifier regulator is preferred to the electronic regulator because no tubes or moving parts are required. Magnetic amplifier regulators are commercially available which provide automatic voltage regulation to within a fraction of one per cent, no load to full load.

Waveform is another factor to consider when preparing specifications for a 400 cycle or other high frequency power generating system. At these frequencies, the output waveform of many commercial alternators is far from sinusoidal. The presence of a high percentage of harmonics in the generator output is undesirable, particularly in test-



**Interior of magnetic amplifier voltage regulator. Such units will give automatic voltage regulation to within a fraction of one per cent, no load to full load**

ing radar equipment. There have been incidents where chokes and other resonant devices have been destroyed by the harmonics which were present in the power supply voltage.

A 400 cycle alternator with less than 2 per cent total harmonic content in the output is considered an excellent generator. For some applications, the total harmonic content must be less than a fraction of one per cent.

Generally speaking, the three phase alternator produces better waveform than a single phase alternator. However, this improvement in waveform is due to internal cancellation of odd harmonics. In order for such cancellation to be effective, it is necessary that the load be "balanced," that is, identical loads on all three phases.

Where single phase, high frequency power is required, power may be derived from a three phase generator by applying the load across any of the individual phases at the output of the three phase generator or between any phase and neutral of a wye connected generator. However, the total load must be distributed as evenly as possible between the phases if good wave form is desired. Where only single phase power is required and it is not practical to load all three phases fairly evenly at all times, a single phase generator should be used.

Where isolation from the utility power lines is desirable or where the voltage regulation of the external power source is poor, a regulated motor generator set may be used to provide stable 60 cycle power.

Direct current for laboratories and production testing is often provided by regulated rectifier units. Usually individual rectifier units are used at each test point. Where a large number of test positions are to be served, it may be advantageous to employ a motor generator set of sufficient capacity to serve all points. The output of the generator is piped to the required locations. With a central system of this type it is possible to supply larger amounts of power to specific points, when required, than can be supplied by the usual individual electronic power supply unit.

The output voltage of the direct current regulator may be adjusted by controlling the generator field current with a rheostat. Automatic regulation may be provided by employing a carbon-pile, finger type, electronic or magnetic amplifier regulator. A compound wound generator operated without an external regulator provides approximately constant voltage output no load to full load.

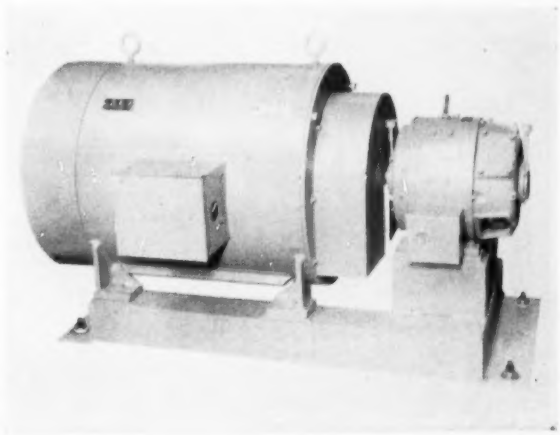
The use of a motor generator set to convert ac to dc has the advantage that filtering of ripple is comparatively easy and that there are less components and no vacuum tubes to require replacement and maintenance. Also it is possible to obtain motor-generator sets having a ripple voltage less than one quarter of one per cent without the use of filters. This is particularly recommended when the time constant of the filter would impair the desired instantaneous regulation.

A great variety of rectifier units is available for providing direct current for testing. Where current requirements are low, electronic power supplies are popular. However, where fairly large current capacity is required, rectifier units using metallic rectifiers are often used. Selenium rectifiers offer the advantages of low voltage drop and high current carrying capacity.

By combining magnetic amplifier regulators with selenium rectifiers, constant voltage direct current can be readily provided. Because vacuum tubes and moving parts are not required, great reliability can be achieved.

Central power systems wherein a single power source is used to provide power to a plurality of points present no particular design problems. Service and branch circuits can be laid out just as in ordinary domestic and industrial power wiring. At the higher power frequencies, consideration should most certainly be given to the effects of long lines. If considered in the same light as audio transmission circuits, no unusual phenomenon should be observed.

One of the problems the power equipment manufacturer faces is the lack of sufficient information from the potential customer. The generally desired information is illustrated by the sample price inquiry information form, Table I. Armed with the desired information on all applicable points, the supplier will be better able to quote on equipment meeting the customer's exact requirements.



**This is a 25 kva synchronous motor generator set with direct connected exciter. Output frequency of this unit is 400 cycles, no load to full load**

# INSECT CONTROL
# For the Modern Industrial Plant

This installation in an Eastern coke plant has proved that insect control can be accompanied by reduction in maintenance and housekeeping costs . . . In addition, it has produced an excellent insect control record

By R. LAWRENCE BRETT, Entomologist, West Disinfecting Co.

AN IMPORTANT TREND is showing up in industry today which indicates that insect control is graduating out of the hit-and-miss school of thought and is coming into its own in regular plant maintenance programs.

Until recently, systematic control of insect pests has been confined largely to the food and related industries, where the presence of insects in any part of the plant constitutes an immediate threat to final products. In other industries, the insect problem is much more difficult to measure. Infestation of locker and dining rooms can be tolerated by a foundry, for example, without endangering the quality of the castings produced. The effect on worker morale and health, although certainly no less important, is impossible to evaluate and is often so subtle as to escape notice.

There are several other reasons that insects have succeeded in evading industrial management's spotlight for so long. One is the general lack of understanding of insects, their habits, and the best methods of dealing with them. Another, and probably the most important, has been the absence until a few years ago of heavy duty equipment, designed specifically for industrial use, which would make systematic insect control of large spaces feasible.

Both of these factors have been of enormous benefit to the bug world. Roaches, the most obvious offenders in locker rooms and other employee areas, have generally been blamed on poor housekeeping. Consequently, in the typical plant, steps would be taken periodically to clean house whenever infestation became heavy. When the insects persisted and infestation reached a point where it could no longer be ignored, maintenance men or outside workers were put to work for long overtime hours to spray infested areas—usually with inadequate equipment. In some cases, the even more costly job of plant fumigation with poisonous gases had to be undertaken.

### Area Spraying Inefficient

In either case, the drop in insect population following these treatments was generally temporary at best. Conscientious housekeeping, while definitely a prerequisite in any insect control program, is by no means a solution in itself. Moreover, one-shot spraying of area by area, and even fumigation procedures, will invariably fail to get all the infestation.

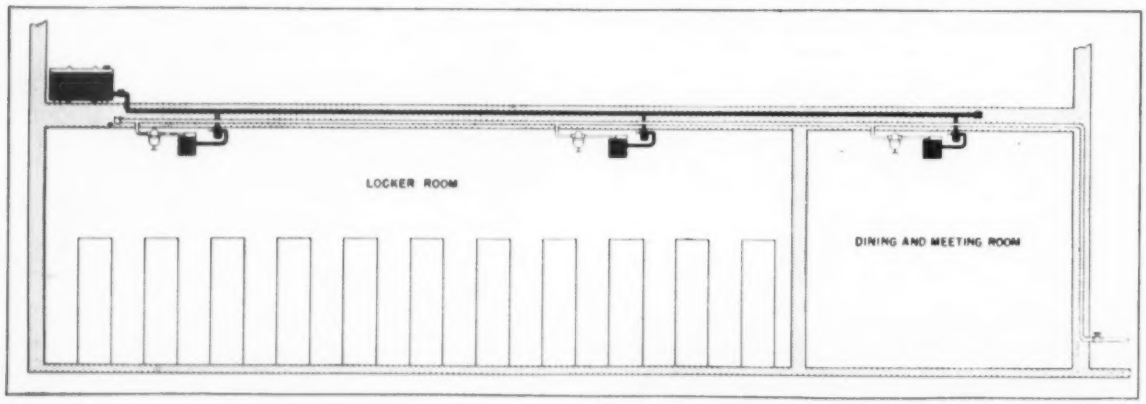
In the case of area spraying, insects are easily irritated by insecticide fumes and have a remarkable ability for escaping from the immediate area to hide until the danger is past. The more complicated procedure of fumigating cuts off this escape route effectively, but it leaves another still open: in any insect infestation, the insects will be found in all stages of their development, i.e., all parts of their life cycle will be represented.

Some of these stages, namely the larval and adult stages, are much more susceptible to control than are the egg and pupae stages. Hence, when a plant is fumigated, only that part of the infestation in the adult and larval stages is destroyed for sure. Many eggs and pupae may still be left unharmed to start the infestation cycle all over again. As an example of this fact, the egg capsule of a female roach may still yield an entirely new family of young roaches, even after the female herself has been killed by insecticide.

The experience of a large eastern coke plant offers a good example of what can be done about this complex problem, and it is also typical of the increasing thought and planning the management of industrial concerns is bringing to bear on insect control.

This plant recently completed an extensive, six-year plant modernization program which included the

Fig. 1. Schematic cross-section of two employee rooms at an Eastern coke plant showing location of a built-in atomizer system which facilitates insect control. White line is compressed air line; black line gravity-feeds insecticide to atomizers



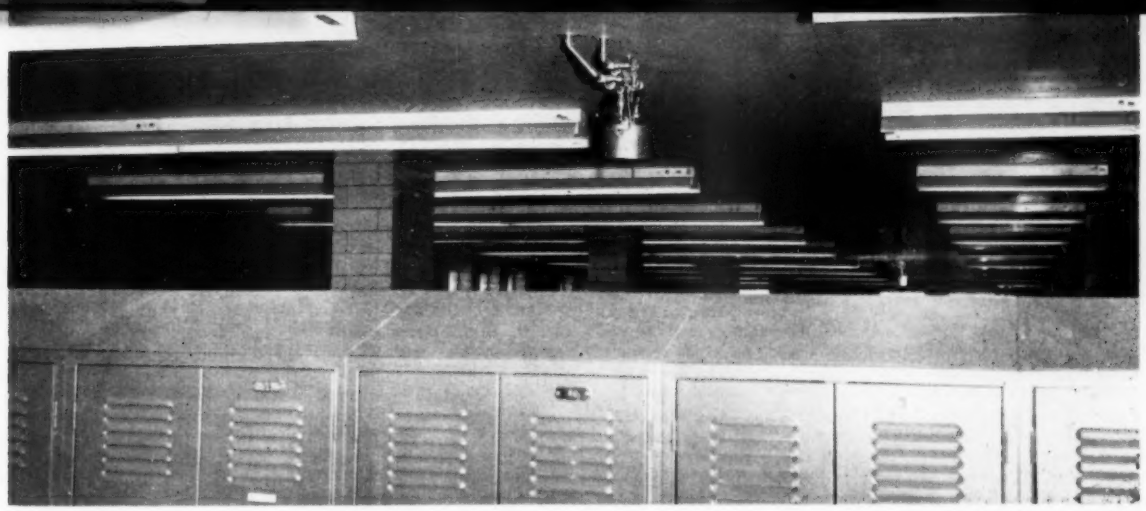


Fig. 2. This view of the locker room in the coke plant shows the position of two atomizers installed in the ceiling

up-dating of much of its equipment and the replacement or remodelling of a number of buildings that had been outgrown. One of the latter was a brick building, well advanced in age, which housed locker, shower, and toilet facilities for the employees. As happened with many established plants, particularly during the war, facilities had been prevented from keeping pace with the increase in employment, and complete replacement of the building was considered more desirable than alteration.

As is also usual in old buildings of this type, it was heavily infested with cockroaches. Attracted by the inevitable debris from lunches and and harbored in a constantly warm, moist atmosphere, roaches had made the cracks and crevices of the old structure their home and had resisted all efforts to dislodge them. Fumigation offered only temporary relief, and housekeeping, though adequate by all other standards, was only successful in keeping infestation down somewhat over what it would have been otherwise.

## Modernization Plans

Management of the company was therefore acutely conscious of the insect problem, and of the importance of controlling it, when plans were being laid to replace the building. One of the first modernization measures they looked into was a recently developed insecticide atomizer system, designed for industrial plants, which can be built into new buildings as easily as it can be installed in existing structures. This system was eventually adopted and incorporated in the new building.

Employees' facilities of the plant are now housed in a modern brick, concrete and terrazzo Employees' Building and Laboratory. A 50 by 150 ft locker room, with adjacent shower rooms and toilets, occupies one wing on the ground floor. Another room, approximately 50 ft square, also on the ground floor, is a dining and meeting room.

With the built-in atomizer system, the company has reduced insect control in these rooms to a simple routine that is as much a part of the regular maintenance program as sweeping the floors, although a great deal easier. The system is composed of three air-operated atomizers in the ceilings, two in the locker room and one in the dining room. In operation the three atomizers are turned on simultaneously at the end of the day, three times a week in winter and daily during the summer.

One man controls the entire operation simply by standing by at an air line valve and turning it on and off at the proper time. By this simple procedure, he can kill all crawling as well as flying insects in the two rooms without even entering them. The fog produced by the atomizers will remain suspended for several hours if windows and doors are kept closed, but if desired, it can be cleared in a matter of minutes by ventilation.

Insecticide is gravity-fed to each atomizer from a 55-gal drum reservoir located on the floor above that of the two rooms. Compressed air is obtained from a line running from the compressor in another part of

Fig. 3. Here, a maintenance man checks insecticide reservoir on the second floor

the plant to a laboratory located on the second floor. Since the system was installed while the plant was being built, the air and insecticide lines are concealed in the ceilings. As has been pointed out, the three atomizers operate simultaneously as a single unit and are controlled from an adjacent utility room by a single valve on the air line.

### Gravity Feed

Each atomizer unit is a cylindrical reservoir of cast zinc-free aluminum, fitted with 10 air-pressure nozzles and 10 precisioned brass insecticide nozzles connected to syphon tubes which extend down into the reservoir. The nozzles are fed by internal suction, so that in operation insecticide is broken up inside the spraying jet and dispersed in all directions to both the upper and lower strata of the room. The lower portion of the atomizer holds insecticide al all times, fed from the central tank and controlled by an internal gravity flow equalizer. The units are designed to dispense insecticide with either air or steam at gage pressures of 50 to 120 psi. In this particular plant, air at 80 psi is used. Each unit is equipped with an insecticide strainer and a self-cleaning air strainer, both of which are located at points on the respective lines just before they enter the atomizer.

The principle on which this type of atomizer works is the dissemination of insecticide particles so small (about 8 microns) that they form a "dry" mist or fog that makes it possible to treat spaces rather than areas. By filling a space quickly with insecticide fog, any insects in the space are cut off from escape, no matter how well they are hidden. Moreover, the small particles of fog remain suspended in the atmosphere instead of settling to the floor or other surfaces. The fog literally goes after the insects by penetrating their hiding places, driving them out into the open to die.

Atomization also saves insecticide and makes more effective use of the quantity that is used. The fact that no insecticide condenses on floors or equipment is important, both for economy and sanitation, and it was one of the chief reasons for the ready acceptance of this type of insect control by the food industry.

The insecticide used in the system is a special one, formulated to have the correct viscosity, surface tension, and killing power for optimum performance when dispensed in the atomizers. The principal active ingredients are pyrethrins and piperonyl butoxide, both of which are among the safest known insecticides to humans and among the most toxic to insects.

In the form of a fog, insecticide particles penetrate the outer covering of the insect, causing deterioration and destruction of the central nervous and respiratory systems. This is followed by paralysis from which the insect never recovers. The surface tension of the insecticide is low, so that it has a "wetting" action on the insect's covering and penetrates it rapidly. The solvent medium is a highly refined hydrocarbon distillate which has no "after-odor," and the formulation is such that no explosive hazard is involved in its use, regardless of the amount which may be atomized in any given space.

The wisdom of regular treatments with insecticide, as is now practised in the company's control program, is well founded in the fact that the life cycles of any insects present are continually interrupted. Even deeply rooted infestations in old buildings can be completely destroyed with systematic fogging with these atomizers.

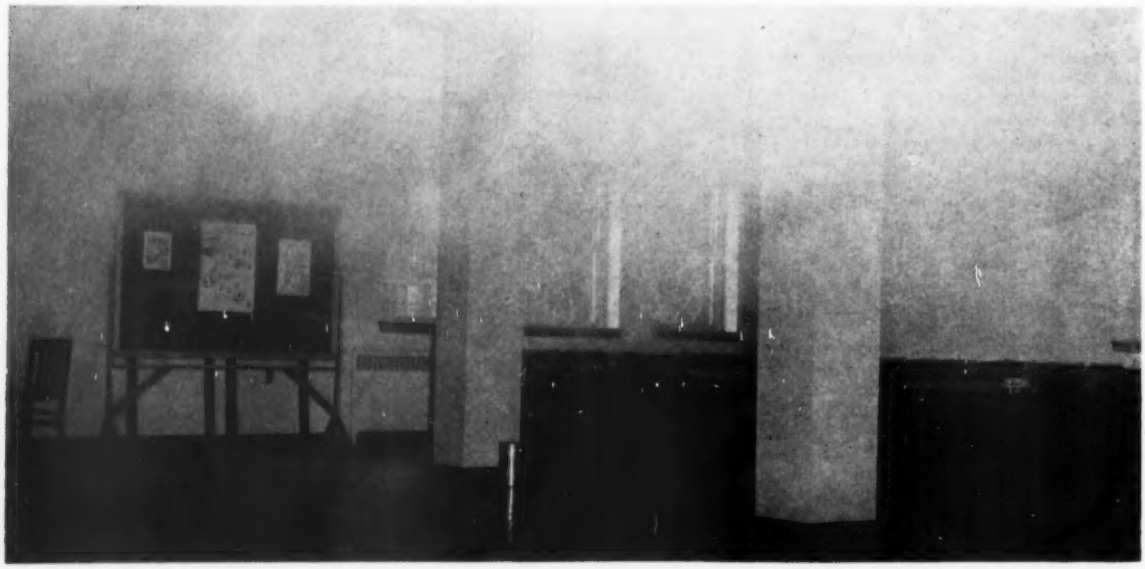
In the case of this particular plant, where the original infestation problem was solved when the building was demolished, regular treatments are important as a preventive measure. Now, insects that are brought into the plant from outside (in beverage cases, food containers, clothing, etc.) never have a chance to spread, and a recurrence of the old infestation is prevented regardless of the number of insects that gain entrance to the rooms.

### Economic Advantages

Some of the advantages cited by the company for this system of insect control can be translated into dollars and cents. To spray the two areas by hand once a week, it can be conservatively estimated that company labor alone (at time and one-half) would cost upwards of $18.00 per week. The cost of outside specialist service would, of course, be even greater. With the automatic system, the areas can be sprayed as often as necessary during the week at no added expenditure for labor. In addition to labor savings, the system allows further economies by making more efficient use of insecticide. There is no spillage waste (most sprayers are hand filled) and there are no losses from condensation; all of the insecticide goes into fog and does the job for which it was intended.

The company has found that the maintenance requirements of the atomizer system are almost negligible. Periodic cleaning of the air and insecticide strainers is the only maintenance generally needed.

**Fig. 4. Photograph taken in the dining room two minutes after the room's single atomizer was turned on. The atomizer produces a dry mist of uniformly sized insecticide particles which remain suspended for hours if all ventilation sources are closed**



# In Six Seconds Metals Go From Hot to Cold

ANOTHER ROOF-RAISING furnace has been installed at Ryan Aeronautical Co., San Diego, Calif. Towering more than 25 ft high, the new heat-treating facility is a modern type of "quick-quench" furnace which can douse hot parts into cold water within a six-second interval.

Designed by the James Knapp Co. of Los Angeles, the unusual furnace is an elevated electric model which is charged from below. The furnace is designed for heat treating aluminum alloys and utilizes a 13,000-gal water tank for quench-cooling them in an instant.

The heat treatment will be employed to render aluminum alloys ductile for forming purposes. These aluminum alloys have the property of hardening with age after heat treatment. For instance, 24S regains 90 per cent of its strength and hardness within 24 hours after heat treatment. It picks up 90 per cent of the remaining 10 per cent within the following 72 hours.

### Rapid Cooling Does Trick

Obviously, if the metals were completely heat treated at the mill they would age harden before being received at Ryan and would be too hard for severe forming requirements. Therefore, the company heat treats them in the plant and either forms them at once or places them under refrigeration until they are to be formed.

By bringing the aluminum alloy up to specified temperatures which are close to 1000 F, it is possible to produce a condition of "solid solution" in which all of the copper in the metal is dissolved without melting the metal. When this occurs the alloy is very ductile.

If the metal is allowed to cool gradually, the copper will precipitate out of solution to form an undesirable precipitate consisting of large particles which substantially reduce the strength of the material. On the other hand, if the metal is suddenly cooled to room temperature, within a few seconds, the copper remains in solid solution. When age hardened, the precipitate is uniformly distributed in extremely minute particles between crystals where it can exert maximum keying effect. By placing the quick-cooled parts in a refrigerator they can be stored indefinitely and retain their good ductility.

The new furnace is an ingenious device for accomplishing the heating and quick-cooling cycles. Constructed of welded steel plates, lined with firebrick, it is supported 8 ft above the plant floor on sturdy steel columns. It was necessary to raise the roof in order to accommodate the upper extremities of the structure.

The compartment is lined with continuous heating elements of nickel chrome alloy which consume 380 kw to give the furnace rapid performance. Parts are loaded into the heating compartment by means of a pneumatic ram which hoists them vertically through the furnace bottom. Two sliding doors, rolling together on horizontal tracks, seal the furnace.

The entire installation is located over a pit which is 23 ft long, 7 ft wide and 11 ft deep below the plant floor. This cavity is designed to contain the water for quench-cooling. The pneumatic ram has a travel of more than 16 ft which is sufficient to take a 750-lb metal load from the furnace to the quench tank and immerse it in water. For loading the furnace, the ram can be stopped and locked at floor level so that carts or racks of metal may be rolled onto the hoist.

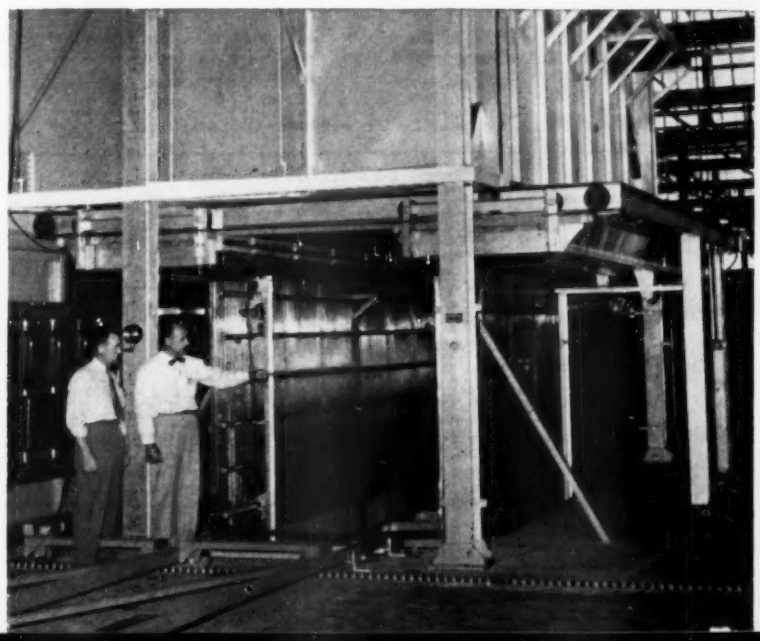
Fully automatic with push-button controls, the furnace incorporates several unique features. It has been designed to maintain temperatures within a plus or minus 5 F of specified settings. This is effected by means of two huge blowers, each powered with a 30-hp electric motor. These blast a flow of air through airflow diverters which picks up the heat from the elements and distributes it uniformly throughout the furnace compartment.

Uniform temperature is an important requirement in this type of heat treating. In order to save time, it is desirable to heat the alloys as hot as possible within a safe range. If the aluminum is heated to slightly too high a temperature, the grain boundary constituents will melt and render the alloys useless. These constituents, which were last to solidify when the alloy was formed, have the lowest melting points of the ingredients and are most susceptible to over heating.

Another special feature of the furnace operation is the automatic arrested descent of the parts load immediately prior to immersion. Ram action is speeded to lower the metal at a rapid pace. However, since the hot, soft aluminum could be badly distorted by impact with the water, this movement is momentarily arrested and the parts are gently lowered into the pool.

Ryan metallurgists have requested an added accessory for the big furnace which is also designed to prevent distortion from uneven cooling. This is a water spray system which is located midway between the furnace bottom and the quench pit surface. After the hot metal is removed from the furnace, the ram will be stopped at floor level and the parts will be spray-quenched from rows of nozzles directed inward. A 40-hp motor driven pump will feed water from the pit to the nozzles.

**Plant engineers Herbert Sadd (right) and Emil Orlando inspect the spray bar arrangement for spray cooling of parts beneath the heat-treating, quick-quench furnace. Both men worked on the installation of this new furnace**



TO READ WHAT YOU SEE—

# ISOMETRIC DRAWINGS Help Pinpoint Power Line Locations

Should you dig for a certain power line? Or should you look overhead? Do you and your electricians know the voltage of every line in the plant? Ever had trouble locating junction boxes or other equipment? The three-dimensional drawings developed by this engineering firm for Thew Shovel Co. have helped speed up work

By **WILLIAM C. GARRETT**, Plant Engineer, Thew Shovel Co.

AT THE LORAIN, OHIO, plant of The Thew Shovel Co., manufacturers of Lorain power shovels and cranes, some electrical lines are underground, some at floor levels and some on or above ceilings. Transformers, junction boxes and other electrical equipment also are in varying locations. Some Thew buildings are new, others were built before the turn of the century.

A few plant electricians who have been with the company many years know from experience where to look for the various lines and equipment after their location is spotted on the usual two-dimensional blueprint, but all too often newer men wasted valuable time deciding whether it would be necessary to dig, look for lines at floor level or higher up.

When new machinery was to be installed, or existing machinery relocated, it often was necessary to go out into our extensive plant to make sure that the electrical system could be tied into the proposed changes. There also was the serious danger to men and machinery of accidentally tying in on a line carrying a voltage other than the one expected.

To save time and money and eliminate hazards incident to all Thew electrical work, the Fischer & Associates Engineering Organization of Cleveland, Ohio, recommended the development of three-dimensional or isometric drawings which would show the location of all electrical lines and equipment in the plant.

The isometric drawing of the electrical system at The Thew Shovel Co. can be read by any craftsman or mechanic. No special training in blueprint reading or engineering is necessary to visualize the exact location of any part of the electrical system. In effect, Fischer & Associates translated the engineering language of the two-dimensional blueprint into terms that any layman can read and understand.

This isometric drawing shows underground wires as dotted lines. All aboveground wires are shown as solid lines. As this three-dimensional system of presentation makes it possible to show approximate height of plant walls, the location of transformers, junction boxes and other equipment is easily indicated. Voltage, size and approximate age of each line is lettered above it. Capacity is indicated for breaker.

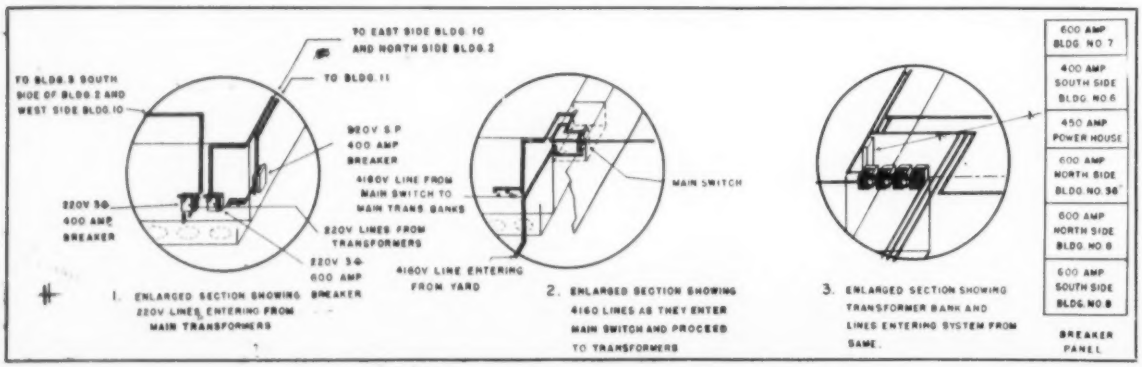
Where several lines meet, and at other complicated points, enlarged views were developed for easy reading. These enlarged views of the congested areas, plus the fully identified normal-size views, eliminate any possibility of confusion in electrical work.

We save both wire and time when new lines are to be run, as the isometric drawing makes it possible to "see" the shortest distances between any two points.

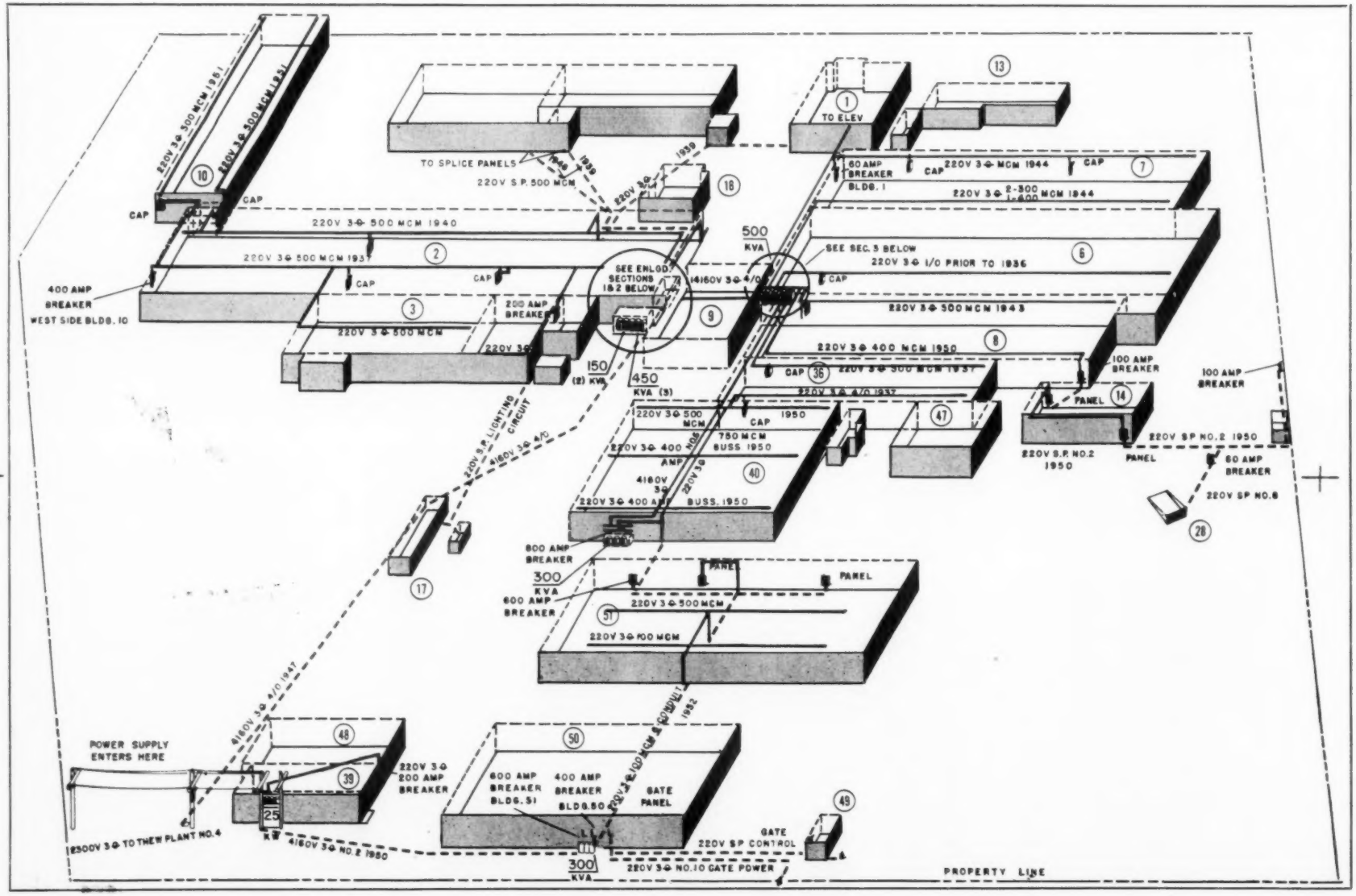
The drawings (on this and the facing page) were prepared by Fischer engineers who worked in our plant in close cooperation with the Thew Plant Engineering Department. All line locations, and location of electrical equipment, were verified by on-the-spot surveys.

The three-dimensional plant service map has effected substantial and continued savings in time on electrical work, at a very small cost. For this reason, we are having the same firm develop other isometric drawings showing the location of plant steam, water, air, gas and sewage lines to further simplify and reduce the cost of other phases of plant engineering.

**Details of lines entering and leaving Thew Shovel Company's transformer banks. It is used with large drawing opposite**


TO EAST SIDE BLDG. 10 AND NORTH SIDE BLDG. 2
TO BLDG. 11
TO BLDG. 8 SOUTH SIDE OF BLDG. 2 AND WEST SIDE BLDG. 10
220V S.P. 400 AMP BREAKER
220V 3Φ 400 AMP BREAKER
220V LINES FROM TRANSFORMERS
220V 3Φ 600 AMP BREAKER
4160V LINE FROM MAIN SWITCH TO MAIN TRANS. BANKS
4160V LINE ENTERING FROM YARD
MAIN SWITCH
600 AMP BLDG. NO. 7
400 AMP SOUTH SIDE BLDG. NO. 6
450 AMP POWER HOUSE
600 AMP NORTH SIDE BLDG. NO. 36
600 AMP NORTH SIDE BLDG. NO. 8
600 AMP SOUTH SIDE BLDG. NO. 8
BREAKER PANEL
1. ENLARGED SECTION SHOWING 220V LINES ENTERING FROM MAIN TRANSFORMERS
2. ENLARGED SECTION SHOWING 4160 LINES AS THEY ENTER MAIN SWITCH AND PROCEED TO TRANSFORMERS
3. ENLARGED SECTION SHOWING TRANSFORMER BANK AND LINES ENTERING SYSTEM FROM SAME.

Isometric drawing of Thew Shovel Company plant layout showing overhead and underground lines, breakers, bus duct. Numbers are in accord with building location system


TO ELEV
TO SPLICE PANELS
220V S.P. 500 MCM
220V 3Φ 500 MCM 1940
220V 3Φ 500 MCM 1937
400 AMP BREAKER WEST SIDE BLDG. 10
200 AMP BREAKER
220V 3Φ 500 MCM
SEE ENLGD. SECTIONS 1&2 BELOW
4160V 3Φ 4/0
SEE SEC. 3 BELOW
220V 3Φ I/O PRIOR TO 1936
500 KVA
60 AMP BREAKER BLDG. 1
220V 3Φ MCM 1944
220V 3Φ 2-300 1-400 MCM 1844
220V 3Φ 500 MCM 1943
220V 3Φ 400 MCM 1950
220V 3Φ 500 MCM 1937
220V 3Φ 4/0 1937
100 AMP BREAKER
PANEL
220V S.P. NO.2 1950
60 AMP BREAKER
220V SP NO.8
150 (2) KVA
450 KVA (3)
220V S.P. LIGHTING CIRCUIT
4160V 3Φ 4/0
220V 3Φ 500 MCM
750 MCM BUSS 1950
220V 3Φ 400 AMP BUSS. 1950
800 AMP BREAKER
300 KVA
600 AMP BREAKER
220V 3Φ 500 MCM
220V 3Φ 100 MCM
4160V 3Φ 4/0 1947
POWER SUPPLY ENTERS HERE
2300V 3Φ TO THEW PLANT NO.4
4160V 3Φ NO.2 1950
220V 3Φ 200 AMP BREAKER
600 AMP BREAKER BLDG. 51
400 AMP BREAKER BLDG. 50
GATE PANEL
2-100 MCM & 1-50 MCM 1932
GATE 220V SP CONTROL
300 KVA
220V 3Φ NO.10 GATE POWER
PROPERTY LINE

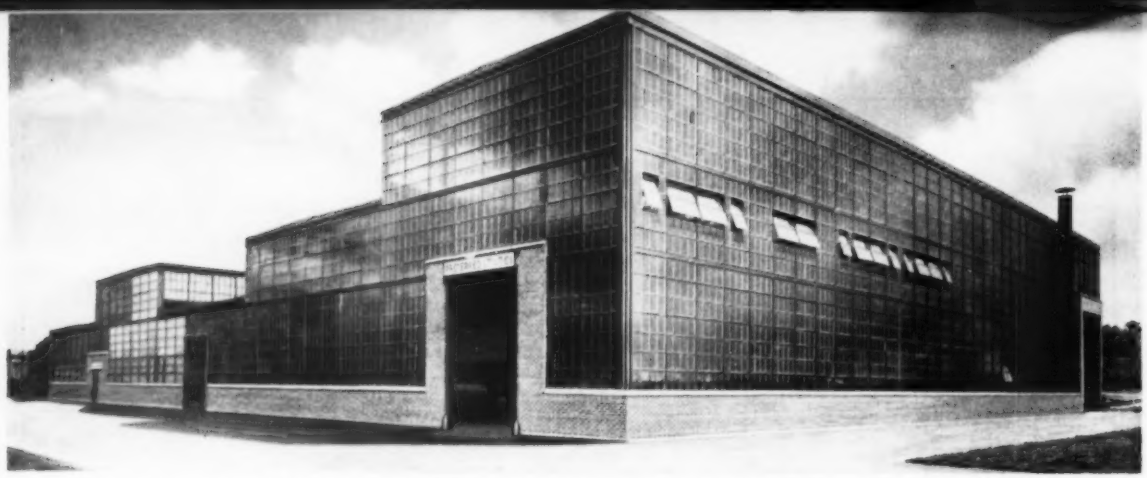


Fig. 1. High-bay assembly area features Preferred Utilities plant. Stack (far right) exhausts fumes from boilers on test

# Layout, Flow and Ideas Combine in DESIGN FOR PRODUCTION

PRODUCTION of a unit steam generator—"package boiler" to the uninitiated—is not a simple operation, but in a plant specifically designed for it, Preferred Utilities Manufacturing Corporation, Danbury, Connecticut, has taken long steps toward making it simpler.

Basically an assembly shop, Preferred receives the majority of the boiler components from outside sources, and assembles them into the various units which are shipped from the plant.

The boiler shell, fabricated by the Bigelow Co., New Haven, Conn., is moved into the assembly bay, and all parts are "fed" to it throughout the assembly process. Minimum handling of these boiler shells during the unit fabrication is a prime factor in the streamlined operation.

The burners (gas or oil fired) used on the steam generators are assembled on specially-designed carts. Assembly starts as these carts are moved between a double row of parts tables, Fig. 4, where parts are stored for easy access by the assemblers. As another handling economy measure, the burner assemblies are left on the carts during all subsequent operations, including testing and painting, until they are mounted in place on the generators.

The fuel pumps for the burners are received at the plant as rough housing castings and gear blanks. In the machining area of the plant, these parts are machined to close tolerances for assembly.

## Impeller Assembly

An interesting innovation, Fig. 2, has been adopted in the fabrication of the pump impellers from the gear and shaft components. Ordinarily, the gear would be keyed or pinned to the shaft; Preferred uses a shrinking process, and achieves a superior bond between the gear and the shaft. The shafts are machined to 0.005 in. tolerance, and the gear bore is machined to the same tolerance. The shafts are placed in a deep freeze unit, where they are cooled to -30 F. The gears are placed in an electrically heated oven, to be heated to 900 F. The two parts are then placed in a jig, and the gear is slid into place on the shaft. As they reach room temperature, the shrinking and expanding of the two parts joins them into a unit almost as strong as if cut from solid stock.

The close tolerances which are built into the pumps often require lapping of the gears after assembly, to insure smooth operation with good vacuum. A shop-built multiple gearshift assembly, Fig. 3, has been devised, to drive the pumps during their "running-in." With an automotive transmission coupled in the drive shaft, three speeds are available, and the pumps are run in at successively higher speeds.

As the boiler shells are insulated and mounted on their bases, they are transferred into the assembly bay, Fig. 6, to receive burner units. These units are delivered to the area on their assembly carts, and mounted on the boilers.

Fig. 2. Oven (left) heats gears for oil pumps, deep freeze (right) chill shafts. Parts fit together

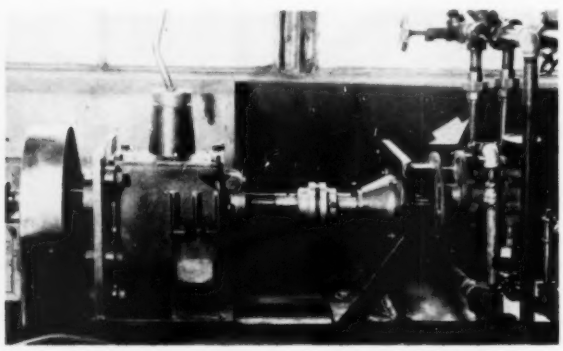


Fig. 3. Completed gear pump (arrow) is coupled to three-speed drive for lapping "run-in." Shop-built drive uses automotive gearshift for speed control as gears smooth out

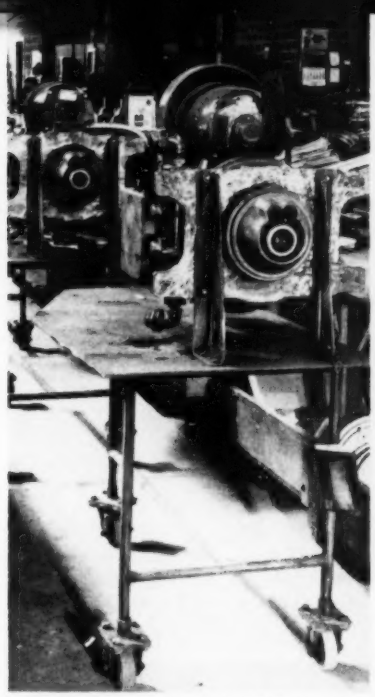


Fig. 4. Burners are assembled on carts

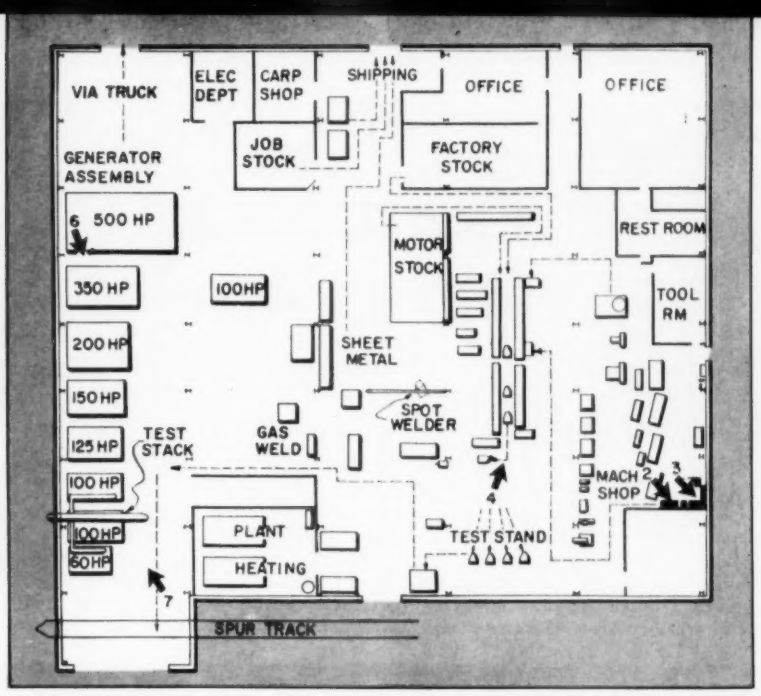



Fig. 5. Plant layout. Arrows indicate location of items in adjoining photographs

Completely assembled, the generators are moved down the assembly bay, toward the test stands, Fig. 7. Here, each unit is run for 8 hours, to determine its performance under steaming conditions. As the end of the assembly and test bay, a rail siding enters the building, for loading the units as tests are completed and final approval is given.

With a final coat of paint, each unit, strapped on a flat car, or in some instances loaded on a truck for shipment, represents a piece of equipment built with a minimum of unnecessary motion or handling, in a plant specifically designed for economical production practices.

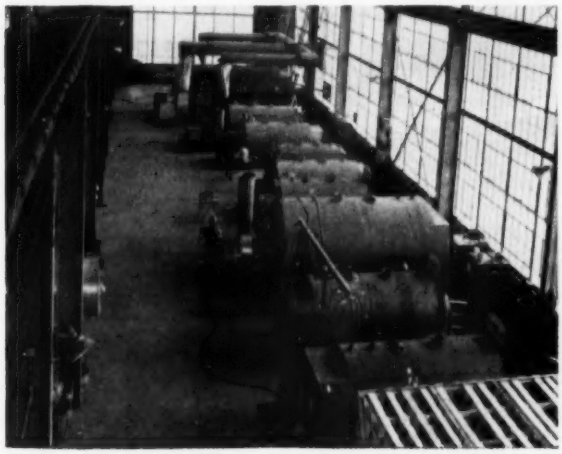


Fig. 6. Steam generators of varying sizes fill assembly bay

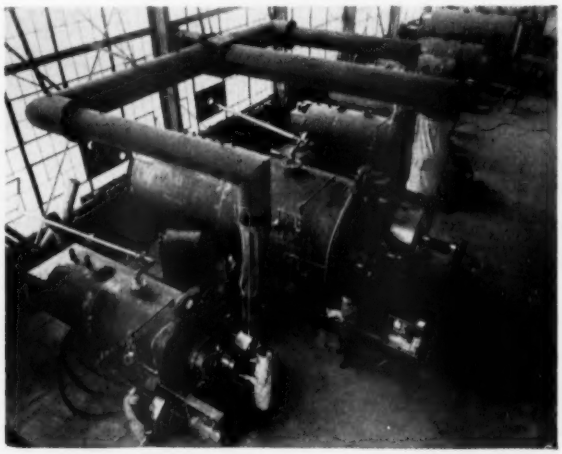


Fig. 7. Test stand area has exhaust for 3 simultaneous tests

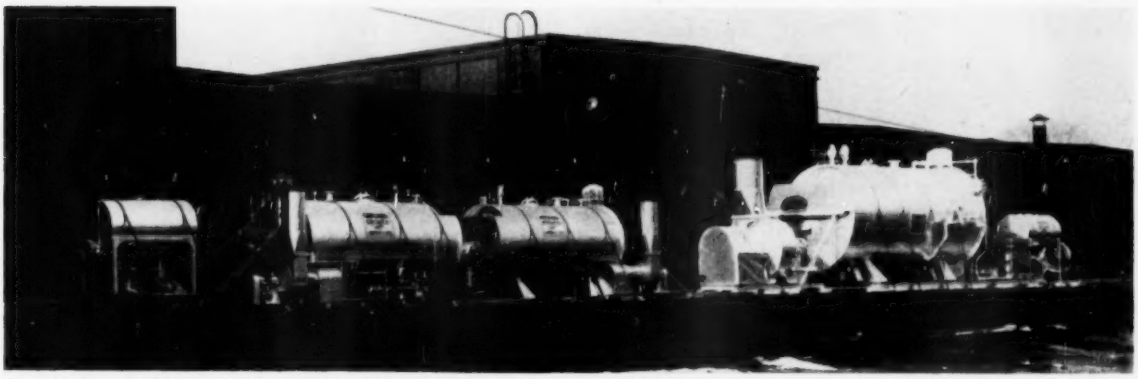


Fig. 8. Completed steam generators await pickup on rail siding which enters building at end of assembly bay for loading

# CRANKSHAFT REPAIR JOB Meets Pumping Crisis Head-On

It took ten weeks to get a new shaft . . . So, this company's maintenance men took over and delivered a top-notch shaft repair job, installed, in less than half that time

A BROKEN CRANKSHAFT in Number Two pumping unit at Service Pipe Line Company's Center Station threatened to be a near-calamity. The break occurred on December 19 and Master Mechanic Fay Cook found, upon investigation, that the pump makers couldn't deliver another shaft in less than 10 weeks.

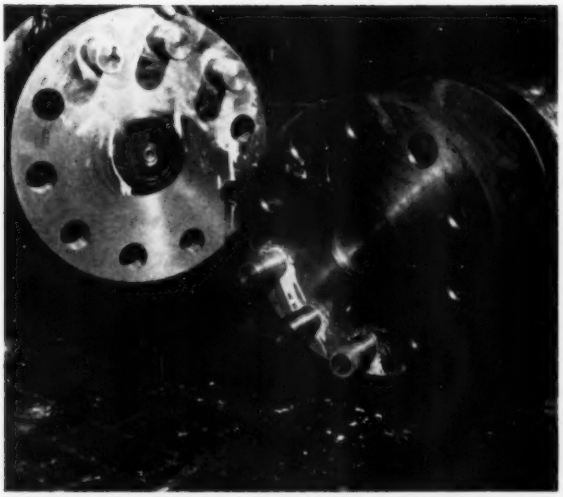
The alternative, therefore, was to repair the broken shaft. It was necessary that the unit be back in operation by February. Other units on the Wood River line could handle the January pumpings but Company's commitments for February were so high that all units were needed. How well the company's technicians and machinists took care of the job is shown in the accompanying photos.

Jagged edges of break are machined off at the point where crankshaft broke. Final cuts being made here

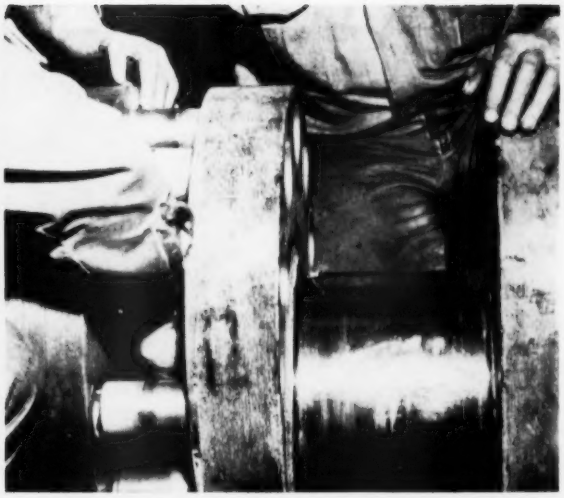
Forging goes into lathe to be machined into short section of crankshaft. Forging weighed 1740 lb before machining

Five working days later the forging looked like this. At one point it was removed from machine and stress-relieved

Holes have been bored and a machinist installs studs in the short section of shaft. Machinists worked around clock



Crankshaft with studs mounted. Bolts were used in other four holes. Male and female joints lined up the two sections



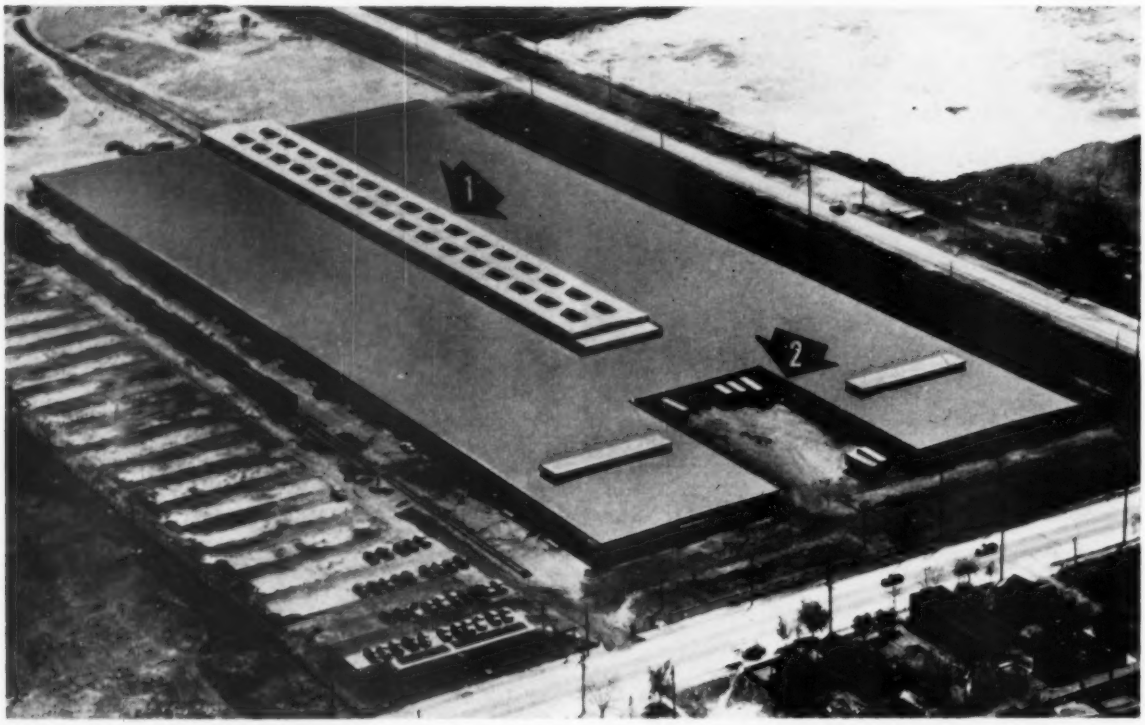
Here, two machinists fit the two sections together. Company's mechanics did job at one-fourth cost of new shaft

Shop personnel machined all nuts, studs and bolts used in repair job. These items were made on smaller lathes

In this photo, one hex nut is shown in place while other two holes show stud and also how holes were counterbored

Mechanic shown boring holes for lock pins, the next step in procedure was to cut hex nuts off flush with surface

Shop Superintendent makes final check before the crankshaft is shipped. Note boards strapped to shaft for protection




Aerial view of warehouse shows (1) the strip of elevated roof dividing the warehouse and covering the rail loading area. Rectangular notch indicated by (2) shows truck loading area before it, too, was roofed in and heaters installed

# SPACE HEATERS in Food Warehouse Do Summer-Winter Duty

With a truck dock and railroad siding that formerly were snow-bound or ice-covered at times in the winter this company found the solution to problems by roofing in these portions of the plant and installing space heaters . . . Loose can labels, rusted cans and soggy cardboard cartons are now avoided by use of heaters in summer

by **FRANK BRITTON**, Chief Engineer, Libby, McNeill & Libby

WARM AIR SPACE heaters in one of the world's largest food order-assembly warehouses have solved a difficult heating and air conditioning problem at a minimum cost, and are saving thousands of dollars a year in preventing food loss and food container damage.

The installation is in the Libby, McNeill & Libby Central Warehouse at Hammond, Indiana. Formerly a War Assets Administration depot, it was taken over by Libby McNeill & Libby in 1949. At that time the only heating equipment was an oil furnace which served the office area at one end of the building.

The concrete-block warehouse, situated on open, flat land near Lake Michigan, contains 450,600 sq ft (over ten acres) of floor area. Ceiling heights are 15 ft at the sides and 18 ft at the center. The sloping roof is of pre-cast concrete topped with slag.

### Outside Walls

When Libby acquired the building, it was H-shaped. A rectangular notch 200 ft long and 123 ft wide, between two jutting wings at the west, or office end, formed part of the H. The other end was formed by an unroofed, 700-ft-long railroad loading area, 74 ft wide, which split the building down the middle for two-thirds of its length. The warehouse thus had twelve outside walls exposed to winter winds which drop temperature in that area as low as 10 deg below zero. Two truck loading doors on the north side of the warehouse, and a door opening onto the end of the railroad platforms, contributed to the high heat loss of the building.

The railroad loading area, with two tracks accommodating 14 boxcars each, was frequently not usable because snow drifted 8 ft deep at track level. At times freight cars in the loading area were coated with ice.

When Libby decided to use the warehouse as an order-assembly center instead of volume storage only, the building design complicated the heating problem. Order assembly meant a much larger warehouse crew, with round-the-clock

use of loading and shipping facilities. (All orders at Hammond are filled, if possible, within 48 hours.) A heating system was needed which would maintain a comfortable working temperature and prevent food from freezing. In addition, year-round dampness, another problem of food warehousing, had to be eliminated. High humidity could rust cans, loosen labels, and reduce food cartons to limp cardboard, causing many thousands of dollars loss annually, in merchandise.

### Thirty Heaters

Experience with volume storage in three buildings Libby had been leasing on an adjoining property showed that twenty-four Dravo space heaters had maintained adequate circulation of warm air in winter and uniform ventilation in summer. These requirements were harder to meet in the new warehouse, but they could obviously be satisfied only by a forced-air system.

Libby engineers again decided on warm-air space heaters, and planned the system around twenty-four similar heaters equipped with burners fired with heavy oil. Six more have been added since, due to building changes. The twenty-four new heaters were floor-installed, the 500,000 Btu units around outside walls, heaters with 750,000 Btu output being placed along walls adjoining the open railroad loading area.

Both 750,000 and 500,000 Btu heaters were used in other parts of the warehouse, of which the most critical were the food storage areas —the two longest legs of the building "H" bordering the railroad platforms. In these two areas, 176 ft wide and 700 ft long, food cases are stacked on the concrete floor in palletized blocks over 12 ft high. But no expensive ductwork system was necessary to provide uniform circulation of warm air among the blocks. The only requirement was connection of short lengths of sheet metal extension to heater outlets, to get discharge nozzles above the tops of the stacked containers.

A 500,000 Btu heater, floor-mounted outside the office area, keeps the offices uniformly warm through a short, ceiling-level ductwork line discharging from 6 outlets. Most of the heaters required connection only to oil and power lines and to light sheet metal vent stacks, a feature which kept installation costs at a minimum. Piping was confined to the oil circulating lines which carry fuel from tanks totaling 70,000 gal capacity.

A record of temperatures, taken twice each night throughout the warehouse, is kept by the maintenance staff. A humidistat is used once a week to check humidity. Contents of canned foods are inspected at various points once a week, at which time temperatures are taken in "can-check" areas. This control system, according to the manager of the Libby Central Warehouse, has revealed no deterioration of food and no rusting of cans or loosened labels. The warehouse is kept at a uniform temperature when outside temperature is as low as -10 degrees. In summer, if excessive humidity is recorded in a certain area, the heater serving that section is turned on until the condition is corrected.

Efficient use of warm air in reducing humidity; keeping food from freezing; and maintaining a comfortable temperature for workers is provided by the recirculating air principle of the heaters. Warm air is discharged from the heater nozzles at a velocity of 2,000 fpm. Air is drawn into the heater bases at floor level, reheated and recirculated. Fuel economy results from this, and because the heaters are self-contained. Each serves the area in which it is located, and operates independently of the others. Although heaters are operated twenty-four hours a day in winter, no down time was reported during the 1951-52 heating season.

The railroad area of this "H"

**One of the two platforms in the railroad loading area. Despite heat loss due to 25-ft ceiling, large monitor window area and cold air influx through open track doors, four warm air heaters keep this area at minimum of 50 F in coldest weather. Heaters, like the one barely visible in upper right portion of picture, are mounted in horizontal position on steel platforms**

shaped warehouse was roofed over so that loading and unloading could be done during the bad weather. Prior to roofing over, the problem of snow removal and frozen car doors presented an acute problem.

The rectangular notch at the opposite end of the building was also just recently roofed over to form a new truck loading area accommodating ten trailer trucks, adding badly needed capacity for this operation. Loading doors have been cut through the building walls, and truck passage doors provided in the new outside wall.

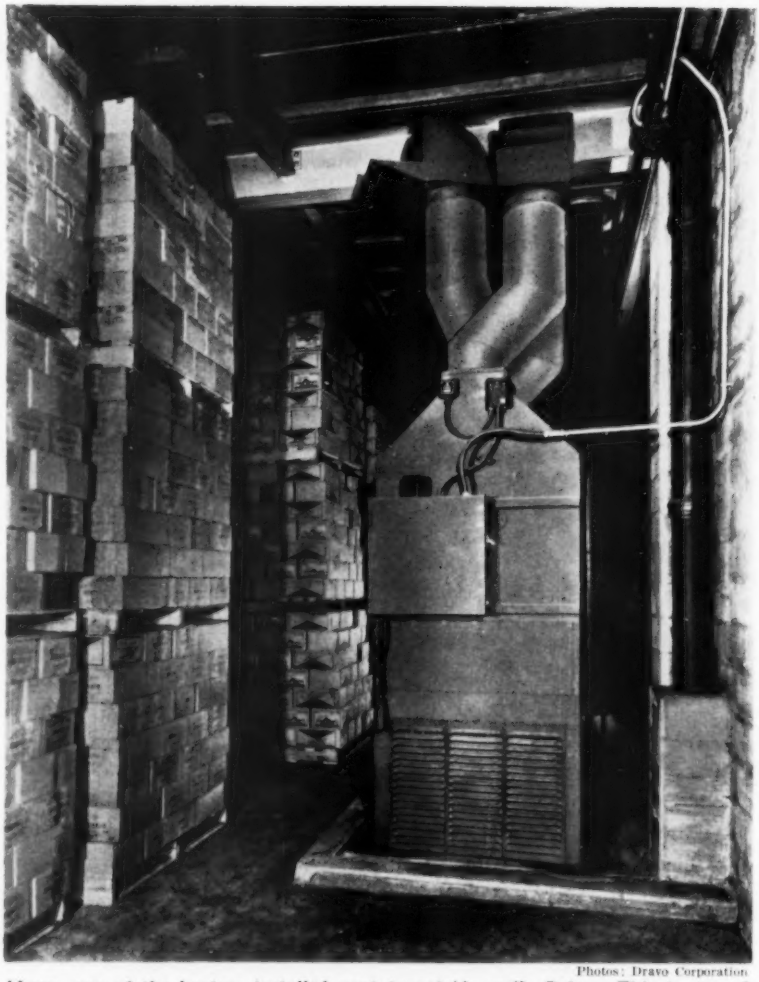
Two 750,000 Btu heaters were recently installed in the truck loading area and are entering their first season of operation. The two are in a suspended position from the 30-ft-high ceiling.

The railroad loading area is heated by four Dravo 750,000 Btu heaters, mounted in a horizontal position on roof-hung structural steel platforms, two above each of the loading platforms. Horizontal mounting of these, and inverted suspension of the heaters in the truck loading area, was possible without major alterations since they have stainless steel combustion chambers which require no refractory lining.

### Loading Area

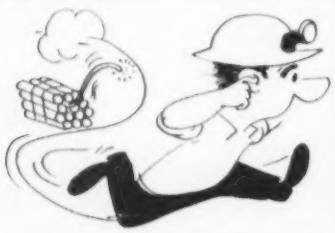
Principal heating problems in the railroad area are the height of the walls, which were increased to 25 ft, and the rows of monitor windows at the top of each side wall. The heaters have overcome these difficulties as well as that of cold air from opened track doors, going into action almost immediately as thermostats respond to cold air admitted through the doors. Discharge nozzles of the two heaters on the north platform are turned in the opposite direction to those on the south platform so that each pair assists the other in effective circulation of warm air throughout the entire area.

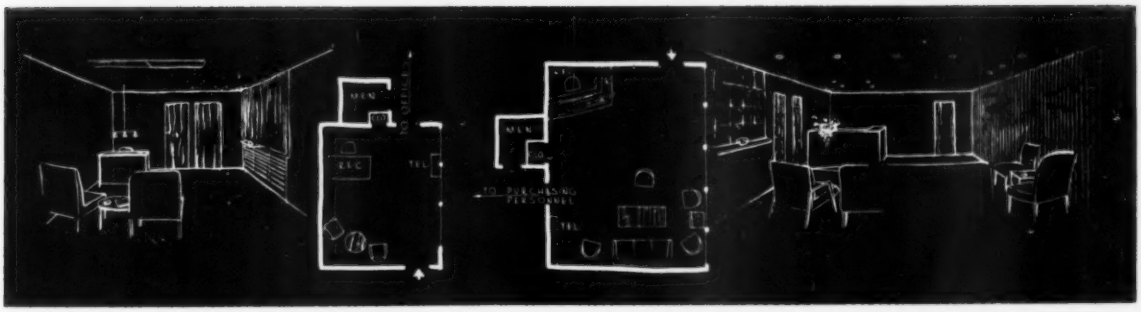
One 750,000 Btu heater, originally placed in the center of the 120-ft-wide cross of the old "H," served to "curtain" the loading door opening onto the railroad platforms. Now that truck loading doors have been cut through the wall opposite the railroad loading doors, this heater supplements the effectiveness of heaters in both loading areas in overcoming cold air influx. Heating contractor was Mosbeck Company, Chicago, Illinois.



Photos: Dravo Corporation

**Above, one of the heaters installed next to outside wall. Below: This is one of heaters installed in open area of warehouse. The warm air from these heaters reduces humidity, protects food from freezing, and maintains a comfortable temperature for workers. Unit serves immediate area and operates independently**





Prepared for Plant Engineering by Shaw Walker Co.

# RECEPTION ROOMS Should Sell the Company and Product

The old saying "You can't tell about a book by its cover" does not apply to the reception room of an industrial plant . . . The reception room is the place where you can display your product, your industry and even your business psychology . . . It will pay dividends to make the reception room attractive so that a visitor feels welcome

**By R. K. GAD, JR., Shaw-Walker Co.**

A GOOD LOOKING, functional reception room can do a terrific job of public relations—and customer relations—for any company. This is the place where you can put on display your product, your industry and even your business psychology. It tells your customer, your friends and even your competitors that yours is a stable and progressive business.

If you are in the glass business, use plenty of it even though you may not make plate glass. If you are in the fertilizer business, you can't pile it around, but you can use plants and get the fertilizer in by inference.

Let people know that your company is a fine place in which to work. Publicize your employee activities. Display the trophies won by them and a picture of last year's picnic (even if it did break up in a battle royal).

Have a booklet for visitors, telling the story of your company, and provide enough light to read it.

But, above all, make the place so attractive it screams "Welcome." Don't forget those vendors calling on you cover a large territory (at their own expense) and you can make them carry your message with a little extra effort.

Make a careful study to determine the peak loads and then provide enough space. Some people have an idea that a crowded reception room indicates a very busy place. To me, it's merely proof that insufficient space was provided.

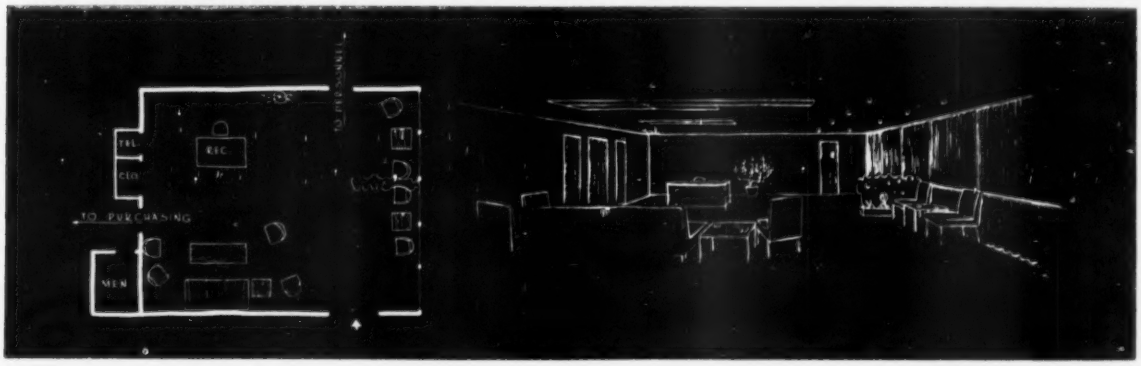
Create one or more areas that are reasonably secluded, by screens, or plants, or furniture arrangements, so that you can receive a man decently in the reception room, when his presence might be embarrassing in the office. In this way, you can see him and send him on his way graciously.

Exercise care in your layout to locate those individuals or groups, having the greatest number of visitors nearest the reception room. This serves two purposes. It cuts down outside traffic through your plant or office and, at the same time, allows you to intercept callers at the reception room without effort.

One thing to remember: you don't have to be a blue-ribbon firm to have an attractive and useful reception room. Some of the smallest companies in the country have done an outstanding job in this respect.

To summarize: Five things that should be provided in every reception room for the visitors are: a place to hang hats; a place to write messages; a telephone; a toilet; and a comfortable chair.

**This architect's rendering, and the one at the top of the page, show how attention to trivial details and creature comforts of callers at your plant can result in attractive and useful reception rooms. They really say "Welcome" to visitors.**



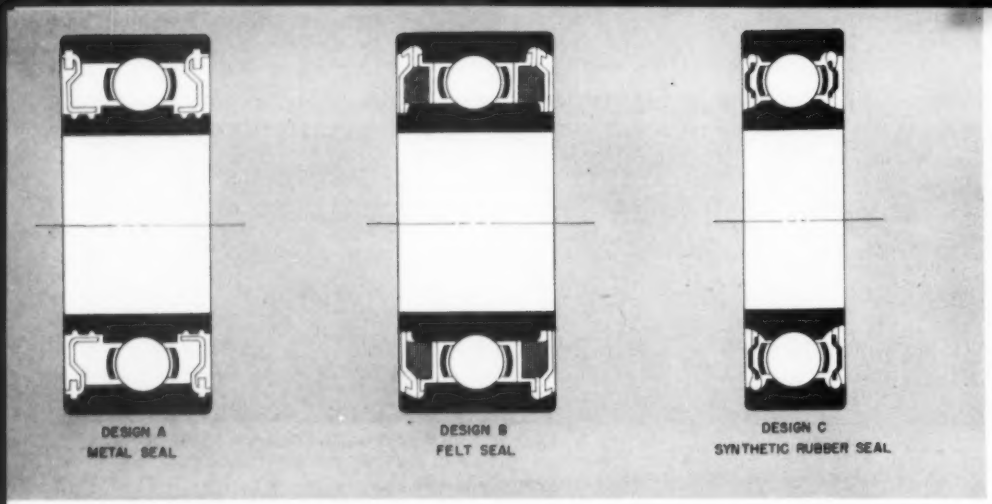



Fig. 1. Self-sealed ball bearings equipped with built-in integral seals are of various designs. The sealing inserts used may be metal, felt, synthetic rubber

# GREASE LUBRICATION OF BALL BEARINGS

The majority of ball bearings in use today are lubricated with grease or some form of grease products . . . Because of the importance of grease lubrication, author discusses various ball bearing seals and best lubrication for each

By E. P. STAHL, The Garlock Packing Co., Palmyra, N. Y.

ALTHOUGH THERE ARE a number of ball bearings in industry lubricated by oil and oil mist, the majority of ball bearings in use today are lubricated with grease or some form of grease products. The development of high grade, high stability greases has made possible the operation of various types of ball bearings at high speeds, under high loads.

On account of the multiplicity of ball bearing designs and the variety of operating conditions, the subject of grease lubrication is too involved to be covered in one article. This article will cover the broad aspects of the subject. The discussion will cover both ball bearings sealed by external non-integral closures as shown in Fig. 3 and also self-sealed ball bearings equipped with built-in, integral seals as shown in Fig. 1.

### Use the Best Greases

It is of primary interest to see that only the best greases are used in bearings.

The simplest and most economically lubricated ball bearing is the so-called integrally-sealed, pre-lubricated, sealed-for-life ball bearing shown in Fig. 1.

The first sealed, pre-lubricated ball bearing was a rather crude device consisting of a steel felt carrier pressed on an extended inner bearing ring as shown in Fig. 2-C. It is thought that these early self-sealed ball bearings were used at the front wheel position on one of the early motor cars. The modern, self-sealed pre-lubricated ball bearing evolved through various stages of development from this rather crude beginning.

Chief advantages of self-sealed, pre-lubricated ball bearings aside from the reduction in maintenance are as follows: 1. Tightly sealed enclosures tend to reduce oxidation of the grease, promoting longer grease life with the attendant longer bearing life; 2. Grease is kept in the bearing and dirt is kept out; 3. A pre-determined amount of the proper grease, packed in the bearing at the time of manufacture, promotes longer bearing life; and 4. In pre-lubricated, self-sealed motor bearings, the bearings are enclosed in a cartridge which protects them from dirt.

Present day self-sealed ball bearings are of various designs sealed with sealing inserts made from various materials—metal, felt and synthetic rubber as shown in Fig. 1. Some are made to special ring widths or standard widths, with seals on one or both sides or a combination of seal and shield. The self-sealed ball bearings are extensively used in motor cars, tractors and general industrial machinery.

When first developed, self-sealed ball bearings were used only in lightly loaded, relatively low speed applications such as small electric motors. The success of this bearing due to its simplicity, unit handling, ease of application and freedom from service has resulted in its use in almost every application requiring anti-friction bearings. The trend toward the use of this type of bearing is pronounced due to the advantages of compactness and simplicity of mounting.

The lubricant used with ball bearings whether externally sealed or integrally sealed with built-in seals is often the determining factor of bearing life. This is particularly true at lighter loading. It is to the interest of ball bearing manufacturers, design engineers and bearing users to see to it that only the best greases are used with their bearings. Good bearings, good seals and good lubricants are the three important factors in modern machine designs. If any one of the three is slighted, it adversely affects the other two.

### Testing Greases

Although it is impossible for a ball bearing user to investigate all bearing greases recommended for normal or special ball bearing applications, it is desirable to test a number of makes and types, keeping in mind storage life, bearing life, noise, torque, heat generation, also high and low temperature limits, water resistance, compatability, the ability to stay in the bearing and ease of handling.

Many ball bearing manufacturers subject greases to rigid tests before recommending them for use with their bearings. Both laboratory and field tests are made. Among the points investigated are torque and leakage at -40 F, -67 F, 80 F,

150 F and 220 F; also work consistency, unworked consistency, water resistance, emulsibility in water, evaporation at 210 F for 50 hours, separation at 212 F for 150 hours, storage bleeding at room temperature, melting or dropping point, wear in friction oxidation, machine and corrosion of copper strip at room temperature and 160 F.

Before considering a grease for use with ball bearings, it is also desirable for a user to consult a lubrication specialist. Since ball bearing recommendations are made by bearing specialists it is equally important that lubricant recommendations be made by lubricant specialists. Many ball bearing companies employ such specialists, and it will prove helpful for a user to inquire about this service.

In all ball bearings, a certain amount of deformation takes place in balls and rings under load. This deformation is generally so small as to be of little consequence. In a ball bearing, because of the shape of the load-carrying members and the conformation of the race curvature to that of the balls, deflection is not a straight line function but shows a marked decrease in rate with increase of load. The fact that there is some deformation of the bearing components with attendant slippage of balls, makes it necessary to use high grade greases for the efficient and successful operation of the bearings. Bearing separators are the principal components requiring lubrication.

Factors favoring grease for use with ball bearings include: Temperature under 150 F, moderate speeds, protection from foreign matter including fumes, necessity for avoidance of intricate enclosures and for extended periods of operation without attention.

A relatively small amount of grease in a ball bearing at the right place at the right time will suffice. Frequently more trouble develops from excess lubrication than from too little. The risk of underlubrication of ball bearings is obvious, but the danger of overlubrication is also serious, resulting in power losses, overheating, excessive wear, wasting the lubricant, shortened life and leakage.

Dirt is Enemy No. 1 of ball bearings. Other common enemies are sulphur, alkali and free acids which cause pitting, etching and corrosion of bearing surfaces. It is important that the lubricant be free of these elements. This brings into focus the importance of using reliable and efficient seals either of the built-in variety previously discussed or non-integral closures shown in Fig. 3.

## Grease Lubrication

Greases in ball bearings are subjected to severe churning at higher speeds. If grease is used with ball bearings at high speeds, a high quality grease is required to eliminate oil separating and escaping from the bearing. If this happens it leaves a gummy residue without lubricating value, which retards free rotation of the balls, and clogged retainers will result causing premature failure of the bearing.

Tendency of most greases to oxi-

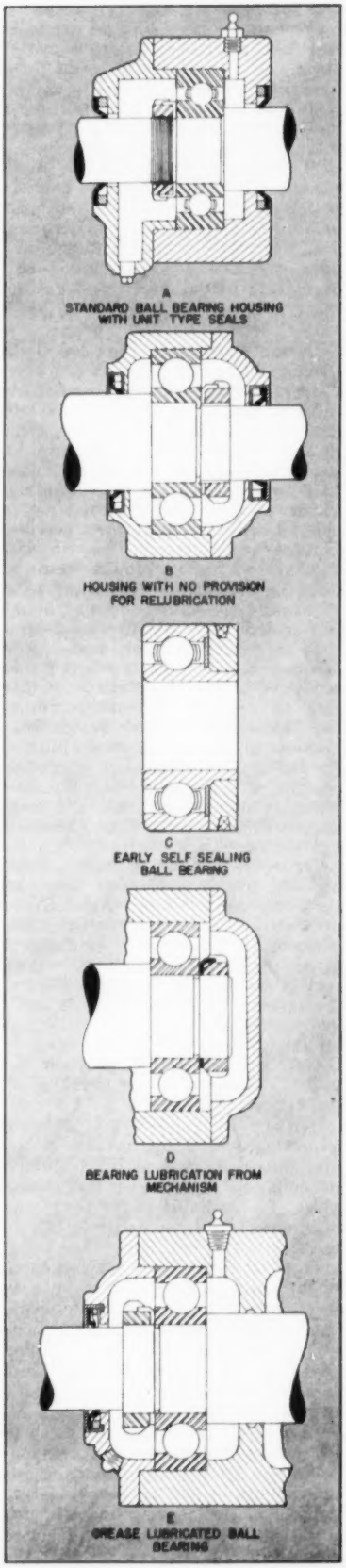
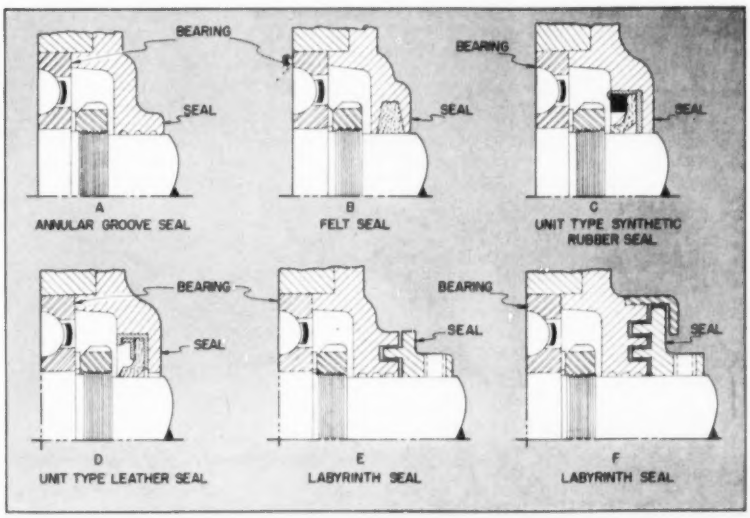



**Fig. 2. Right: Several designs of bearing housings are shown. Design A has been used for many years; Design B has no provision for periodic re-greasing; Design C shows early self-sealing arrangement; in Design D the grease in mechanism lubricates the bearing; and Design E provides for relubrication**

**Fig. 3. Below: Various forms of non-integral closures used with ball bearings are shown: Design A has an annular grease groove clearance seal; Design B has a felt grease seal; Designs C and D have synthetic rubber and leather contact seals; Designs E and F have combination grease groove and metal labyrinth seals**



dize on exposure to the atmosphere may deposit a hard film on the balls and bearing rings. Tight bearings and noisy operation will result from hardened grease with injury to the balls and rings. This condition generally follows extended periods of machine idleness. Periodic running of bearings and addition of fresh grease to the bearing housing equipped with non-integral closures as shown in design covered by Fig. 2-A will lessen this condition. However, presence of oxidized grease will accelerate oxidation of new grease.

### Bearing Housings

Design shown in Fig. 2-A is a preferred design, one that has been used successfully for years. It permits all grease applied to pass into and through the ball bearing. This design supplies the grease from a point adjacent to the face of the ball bearing on one side. The interior of the bearing housing is shaped to direct the grease into the bearing so that even the smallest amount reaches the points where it does the most good. This is a typical externally-sealed ball bearing housing sealed with spring-loaded unit type synthetic rubber seals. The bearing housing in this design is equipped with a pressure relief fitting to prevent overlubrication of the bearing. With this design it is possible to remove the drain plug at the bottom of the housing, purge the bearing of old grease when the machine is overhauled and add new grease thus assuring long, carefree bearing service.

Figure 2-B shows a ball bearing housing design fitted with unit type synthetic rubber seals in which no provision is made for periodic regreasing. This type of housing is often used in applications where speeds are low, the loads light, and the service intermittent. Such service requires a change of lubricant at long intervals and the bearing is therefore lubricated only when the unit is disassembled for overhaul or inspection.

Figure 2-D covers a bearing mounting where the grease in the mechanism is used to lubricate the bearing. In such cases the grease must be suitable for both the mechanism and the bearing. There must be no danger due to the presence of foreign matter such as sand, scale, metallic particles from gear teeth action, and sludge. In some cases a baffle plate or slinger is necessary between the bearing and shaft shoulder to avoid direct and forceful pumping of grease into the bearing housing.

In designing housings and closures for grease lubrication the space surrounding the bearing should be approximately equal to the air space volume of the bearing and the closure should be so designed as to confine the grease as near to the bearing as possible, since only the grease in proximity to the running parts of the bearings is effective as a lubricant.

If it is desirable to provide facilities for relubrication, they may be arranged somewhat as shown in Figure 2-E. It will be noted from this design that the grease fitting is on one side of the bearing and the drain plug on the other side so that when fresh grease is added it will pass through the bearing and thus tend to remove the old grease.

In lubricating such a bearing, the drain plug should first be removed and clean new grease added. This should be continued until the old grease has ceased to come out of the drain plug and the fresh grease is visible. The unit should then be run for a short time with the drain plug removed to permit any excess grease to escape from the housing.

In case of inaccessible locations, it may be desirable to use pressure relief fittings as shown in Fig. 2-A to prevent overgreasing of the bearing and to guard against blowing the seals out of the housing. Generally speaking, the bearing housing should not be more than one-third to one-half full of grease. No ironclad rule can be followed in this regard as the amount of grease to be used depends upon the design of housing and operating conditions. Unit type synthetic rubber or leather seals as shown in Fig. 3, Designs C and D retain the grease in the bearing and prevent the entrance of dirt or water into the housing.

Various forms of non-integral closures or seals are used with ball bearings. Some of these are shown in Fig. 3. Design A shows an annular grease groove clearance seal suitable for use with grease lubricated ball bearings at low, medium and high speeds where some leakage can be tolerated. The grease between the grooves and the shaft forms the seal of this design. Effectiveness of this type of seal depends on the number of grooves used and the clearance over the shaft.

Design B shows a felt grease seal suitable for low and moderate speeds. This is a rubbing type seal and its effectiveness depends on the resiliency of the felt and the hardness and smoothness of the shaft upon which the seal operates.

### Combination Groove and Seal

Designs E and F show combination grease groove and metal labyrinth seals suitable for low, medium and high speeds. These designs are useful for sealing against grease where severe dirt and temperature conditions prevail. As with the annular grease groove seal described for Design A the grease in the grooves between the seal parts forms the seal.

Designs C and D show spring-loaded unit type synthetic rubber and leather contact seals. Their effectiveness depends to a great extent upon the spring tension and the smoothness and hardness of the surface upon which they operate.

Bearing engineers favor the use of pure high stability sodium grease with possibly a small amount of calcium soap added to improve the texture for use with ball bearings.

## Best Wishes Cabled to Incorporated Plant Engineers in England

THE CONTINUING GROWTH OF THE INCORPORATED PLANT ENGINEERS HAS BEEN AN INSPIRATION TO PLANT ENGINEERS OF ALL NATIONS AND WE ARE CONFIDENT THE SOUTHPORT CONFERENCE WILL SET NEW RECORDS. IN THIS BELIEF, I AM JOINED BY DICK MORRIS, AMERICAN MEMBERS OF THE ASSOCIATION AND THE PLANT ENGINEERS' CLUBS OF THE UNITED STATES. ENGINEERS WHO MET WITH THE SPECIALISTS TEAM LAST YEAR IN PHILADELPHIA AND CHICAGO ARE UNANIMOUS IN THEIR OPINION THAT THE OPPORTUNITY TO MEET AND TALK WITH THEIR OPPOSITE NUMBER FROM OVERSEAS WAS A RARE PRIVILEGE. ONLY CIRCUMSTANCES PREVENT US FROM BEING THERE TO PARTICIPATE IN THIS GROUP DISCUSSION WHICH SHOULD BE THE HIGHLIGHT OF THE CONFERENCE. ONLY BY FREE INTERCHANGE OF INFORMATION THROUGH CONFERENCES, CORRESPONDENCE AND MAGAZINES CAN PLANT ENGINEERS PROGRESS. ONLY THROUGH CAPABLE PLANT ENGINEERS CAN PRODUCTIVITY BE INCREASED. ONLY THROUGH INCREASED PRODUCTIVITY CAN CIVILIZATION PROGRESS. OUR BEST WISHES TO YOU AND ALL OF OUR GOOD FRIENDS AND FELLOW MEMBERS. *TOM HANSON, EDITOR, PLANT ENGINEERING.*

**AND THEIR REPLY:**

OUR SINCERE THANKS FOR YOUR INSPIRING MESSAGE TO OUR CONFERENCE. OUR DISAPPOINTMENT THAT WE CANNOT ENJOY THE PLEASURE AND BENEFIT OF YOUR ATTENDANCE IS DOUBLED BECAUSE WE HOPE THAT OUR CORONATION CONFERENCE WILL BE OUR BEST. MATCHING THE SPIRIT ABROAD IN BRITAIN THIS YEAR WE BELIEVE THAT INCREASED PRODUCTIVITY IS ESSENTIAL NOT ONLY TO PROGRESS BUT TO THE SURVIVAL OF THOSE STANDARDS AND IDEALS COMMON TO OUR TWO COUNTRIES AND TO THE WESTERN WORLD. WE BELIEVE, TOO, THAT THIS CAN ONLY BE ACHIEVED BY THE OPEN-HEARTED FRIENDSHIP AND COOPERATION WHICH YOU HAVE ALWAYS SO GENEROUSLY OFFERED US AND WHICH WE WILL ALWAYS ENDEAVOR TO RECIPROCATE. *HADLEIGH SEABORNE, GENERAL SECRETARY, INCORPORATED PLANT ENGINEERS, ENGLAND.*

# 7....

# ECONOMIC FACTORS In Industrial Lighting

By **LEONARD V. JAMES**, Illuminating Engineering Consultant

NO ITEM of cost or expense, of any kind in any establishment, is adequately analyzed until the benefits to be derived also are evaluated. The balance then struck, between these two accounts, determines whether the detail under consideration pays its way or fails to do so.

It is not always possible to make these evaluations on a strictly tangible basis, which does not mean that the intangible results may not justify the expense. A personal example of this may be money spent on a vacation.

### Lighting—A Production Tool

At one time, lighting was considered as being in much the same category as janitor service or perhaps drinking water. It was recognized as a necessary building detail, of no particular importance to production but nonetheless indispensable. The cost of owning and operating a lighting system was a drain on the profits which could not be avoided but should be kept to a minimum value.

At the time of the first World War, few plants or offices were lighted to more than 2 or 3 ft-c. But the influence of lighting on production had been noted by some and, as is usual in the stress of war, was confirmed by improved installations in many plants. A list of reasons for this result follows:

Increased production results from improved lighting because of: 1. Increased speed of vision; 2. Increased accuracy of vision; 3. Elimination of direct and reflected glare; 4. Uniform working conditions throughout the day; 5. Improved supervision; 6. Reduction of accidents and improvement of health; 7. Improved morale; 8. Reduction in labor turnover; and 9. Greater ease in filling vacancies with best workers.

To the above should usually be added decreased spoilage of material, a more continuous operation of expensive equipment and a decreased investment and expense for unavailable floor-space.

Readers of this series of articles, who started with that in the January, 1953 issue on "Lighting for Seeing in Industry" will recognize the above reasons as dependent in every case on improved "seeing" on the part of those involved. Fatigue was not mentioned in the list, nor conservation of the energy capacity of the "human seeing machine," exhausted less rapidly under the better seeing conditions. These were refinements to come later. But the list, amplified as indicated, still covers the practical reasons for the improved operation resulting from better lighting.

### Benefits of Lighting

Some of the results given in the above list (increased production, less spoilage, reduced absenteeism, lower frequency of accidents, etc.) are capable of rather precise evaluation. But there are always questions—is the improved lighting alone responsible? will the better operation continue? etc.

Precise determinations have not been necessary when a large percentage increase in lighting levels has been made from very low initial values. But, as this lighting has been improved to the point where the law of diminishing returns sets in, where other conditions control in restricting operations, the matter becomes acute. We have arrived at that point today in many plants, where the question now is whether the amount of 30 or 50 ft-c in use is the most economical, everything considered, or would half or double these values be more profitable?

Instead of trying to answer this question directly, many managers and their advisers elect to determine the cost of the lighting rather accurately. They then compare this with the probable value of employee benefits and influence on production. This is done by relating the lighting cost to other operating costs and judging whether the above probable results may be such as to justify the relative lighting expenditure.

Lighting cost is a combination of

All illustrations: General Electric Co.

**Fig. 1. A portion of the F. W. Wakefield Brass Co. plant at Vermilion, Ohio, shows present day application of lighting for working and seeing environments**

**Fig. 2. Where side brightness of lighting fixtures is well controlled and lamps shielded, they may be mounted crosswise of the normal viewing direction**

the amortized first or installation cost and the total operating expense. The former properly includes also interest and taxes on the investment. The latter includes the cost of energy (kilowatt-hours) and that for the replacement of lamps. The expense for cleaning and other maintenance details must also be included somewhere.

By amortization is meant the annual charge, throughout a given number of years, needed to cover the first cost, plus the investment costs or expense of interest and taxes. The shorter the life period allotted, the greater the annual amortization charge.

Some industrial (and office) lighting installations are used for many years without change. One should consider, however, the frequency of major changes in sources and other equipment, and also those in lighting practice, during perhaps the last 30 years. Levels have increased from 1 to 2 ft-c to 30 to 100 ft-c; sources have changed from simple incandescent to include also mercury and fluorescent lamps and reflector type incandescent; equipment from bare lamps or open, flat reflectors to types for all sources that are both efficient in light delivery and effective in brightness control.

On this basis, the writer has recognized six years as a reasonable and satisfactory period. Surely, if the system will pay for itself in six years, the management is safe from the replacement standpoint. Also, if the installation is then found satisfactory for use through a longer period, it will be correspondingly more profitable.

On this six year basis, the annual charge to cover the first cost will be 16-⅔ per cent of that cost. The charge for interest, even at 6 per cent, will average 3 per cent of the first cost, because of the decreasing principal. Tax rates vary so much that it is not practical to select a value for them in this article.

## Cleaning Cost

Cleaning is generally regarded as an operating expense; certainly it is not a capital expense. But the period between cleanings is not determined by the extent to which the lighting is used. It is even true in some cases that the more the lamps are turned on, the less soil will accumulate. It is also true that the amount of soil that will accumulate on the equipment and the ease with which it is removed will depend on the fixture selection and the general atmospheric conditions than on the operation of the lighting system.

Since this item then is independent of the hours of operation of the lighting system, many engineers will include it in the annual fixed charge which includes amortization. They also will lump maintenance of equipment, except replacement of lamps (and starters where used), into this cleaning expense, as modern lighting equipment is so well standardized that very little repair maintenance is required.

The amount of expense for cleaning is another item which will vary greatly, depending on the type of equipment, its accessibility, the location and type of plant or office, etc.* If a general allowance of about 5 per cent of the first cost is made and this is added to the amortized charge, plus also that for interest and taxes, the total will become about 25 per cent. This is one-fourth of the first cost, to cover the fixed charges per year. Any deviation from the assumptions made merely requires a slight alteration in the assumed life to make up the discrepancy.

The remaining expenses are two—for electrical energy and for lamp replacements. Both depend in part on hours of burning. It is desirable that this be determined "generously." If the lighting should be pe-

**Fig. 3. Lighting in this plant is produced by the continuous rows of fixtures. Some light is delivered toward the ceiling to provide a good brightness balance**

* In comparing systems or fixtures, the cleaning period for a given expense can well be introduced into the relative foot-candles delivered as one of the bases for selection.

nalized unduly and still be found justified, so much the better. The "burden of proof," as the lawyers would say, is on the lighting.

Artificial lighting seldom is used today as an adjunct to daylight, except as it is added to that daylight. In practically all cases, part or all of the lighting will be on all the time the plant or office is operating. Allowance must also be made for clean-up time, when the plant is not operating. The kilowatt-hour consumption particularly is likely to represent a major part of the lighting cost and it will be determined no more accurately than are the hours of use.

The total connected load in kilowatts should include the loss in ballasts for fluorescent or mercury lamps, and the rate for electricity should include both consumption and demand charges, where the latter apply. Where the electricity is generated in the plant power house, the entire cost of this energy should be determined. This will include, in addition to the fuel and power plant operation and amortization costs, also those for the distribution system properly chargeable to the lighting. The writer is not trying to "load" the lighting cost, but intends that this should carry whatever burden is justified.

Multiplying the total connected load for lighting by the average hours per year that all of it is used and by the average rate or cost per kilowatt-hour for the electricity, gives this annual charge for energy. When desired, the average burning hours by departments or sections of the plant may be used with the connected loads in those areas. The results so obtained are then accumulated to get the total.

### Lamp Replacement

Lamp manufacturers publish the average rated life of their lamps and in general these values may be used, recognizing that some will fail earlier while others will last longer than this announced average. Where the plant engineer has reason to believe that he is getting less (or more) than this average life, an investigation is in order. "Less" means greater than proper lamp replacement cost. "More" means reduced efficiency of the amps. He may find that the socket voltage is not proper for the lamp, that excessive vibration or physical shock is present or, in the case of "discharge" lamps—mercury or fluorescent—that the ballast or transformer control is not functioning properly.

The total number of lamp-hours burned (the number of lamps in use times the average burning hours in the year), divided by the average lamp life, gives the number of replacements. The cost of each replacement is the net cost of the lamp itself and of any starters that have to be replaced, plus the labor cost of removing the old lamp and installing the new one.

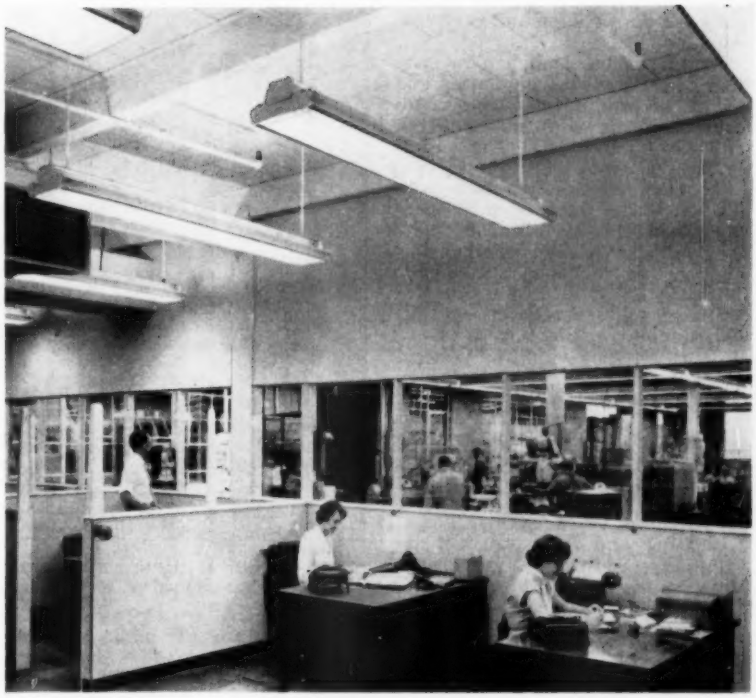


**Fig. 4. The lighting levels at the desks in this small office are between 85 and 100 ft-c. Note the high-level of grid lighting in the shop in the background**

Obviously, this labor cost is not inconsequential. This is best explained by an example. The call announcing the outage comes in to the maintenance department and the workman gets the lamp and the necessary ladder or other equipment, taking them to the location. He then removes the old lamp, perhaps removing part of the fixture to get at it, and installs the new lamp. Restoring the fixture parts, he replaces the equipment and discards the old lamp, breaking it up with others that have been accumulated and removes the broken material.

Where this must be done for individual lamps, in a large establishment, the incidental cost can and frequently does exceed the lamp cost. There is abundant reason, therefore, for some plan for grouping replacements. Many plants are finding it economical to "group replace" all lamps in the plant, or in a given area, at one time, the period between replacements being when the lamps have burned 80 per cent of the rated average lamp life.

The lamp and labor replacement cost, multiplied by the number of lamps to be replaced in the year or other period being considered, provides this part of the lighting cost. The total lighting cost then becomes the fixed charge for amortization, cleaning, plus the energy charge, plus the lamp replacement charge.

The calculation is often simplified by computing for one month instead of for one year. In this case, 2 per cent of the first cost is used for the fixed charge, instead of the 25 per cent, and the hours in use per month are substituted for the hours in use per year.

Explained in words, all of this seems complex. That it really is very simple is indicated in the paragraphs below.

Total cost of lighting per month is based on fixed charges plus operating charges.

**Fixed Charges**—are 2 per cent of first cost of installation. This includes amortization, interest, taxes, cleaning and maintenance of equipment, except lamps and starters.

**Operating Charges**—consists of electrical energy plus lamp replacement. Electrical energy is the kilowatt connected load times average hours used in period times average rate for electricity.

**Lamp Replacement**—is the number of replacements times cost per replacement. Number of replacements is total number of lamps in area times the average hours in use in period, divided by the rated life per lamp. Cost per replacement is the net cost of the lamp (and starter when also replaced) plus the cost of the labor involved.

Having found the cost of light for the period, the next step is to compare this, in its right proportion, with other parts of the cost of production. Relating it to payroll gives a percentage which can be applied to the 480 minutes in the working day, for comparison purposes. For instance, if the lighting cost is 1 per cent of the payroll cost, it is equiva-

lent each day to 4.8 minutes of employment.

The management might now consider whether the same quantity and quality of production would result from operating with no light but with 4.8 minutes daily overtime at the base pay rate, or from operating 2.4 minutes overtime regularly with but half of the light, or from operating normally with all of the light. They will also consider whether they might get as satisfactory production results in 4.8 minutes less time (or a correspondingly reduced payroll) with double the lighting.

### A Case Study

At this point it is well to review the benefits to be expected from good lighting as listed earlier in this article, bearing in mind that improved lighting beyond an existing standard is being considered, not good lighting versus no lighting.

Lighting and labor are not the only items of production expense. Many of the others, however, such as spoilage, supervision and accidents are related to labor cost and can be considered with it. But in many plants, expensive tools or equipment, rather than the payroll, actually dominate the operation. Here the lighting costs may be related to the corresponding costs of ownership and of operation of these facilities. A good plan in this case is to consider the lighting as a part of such tools, which part may be satisfactorily effective or not, and what it would cost to make this part effective.

Manufacturing costs vary so greatly that a single application can serve only as an illustration of the principles involved. To help explain these costs we will select an assembly plant, making certain small devices, see Fig. 5. Continuous table benches, 4 ft wide, are spaced 10 ft apart on centers. The workers are located at 4 ft intervals along each side.

Eighty-five footcandles are provided over this work by two continuous

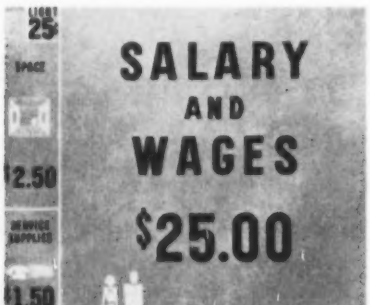



**Fig. 6. In a typical well appointed office, the lighting costs will be about 1 per cent as much as the payroll; i.e. 25 cents a square foot compared to $25**

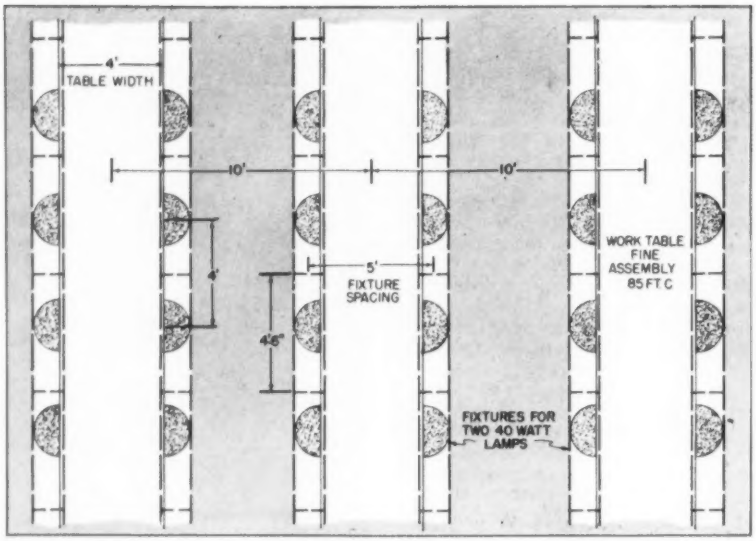



**Fig. 5. Sketch of lighting and work layout for a small assembly plant. The lighting cost is equivalent to that paid the workers for 2½ minutes of the day**

rows of fixtures per table, each fixture containing two 40-watt fluorescent lamps. The rows are located above the heads of the workers to prevent shadows and to light any elevated part of the work. (Two of the fixtures, opposite in the rows, serving 45 sq ft, will develop 9400 lumens and are assumed here to deliver 3800 lumens—40 per cent maintained utilization—to the work, or 85 per sq ft, hence 85 ft-c.)

The average working month is 168 hours and the workers are paid $1.50 per hour, thus the payroll for the two workers is $504 per month.

It is assumed that the complete installation cost for the two fixtures and incidental wiring is $80. The fixed charges, which are 2 per cent of this, are $1.60 per month.

Including cleaning time, the lighting is assumed to be operating 200 hours per month. The two fixtures, including a 2 per cent loss in the wiring from the meter, consume 195 watts. Thus the charge for electricity, at an assumed rate of 3 cents per kilowatt-hour becomes $1.17 per month.

The lamp hours per month (four lamps) are 800. The rated lamp life is 7500 hours, so one lamp will be replaced in about every 10 months, on the average. The lamps list at $1.05 each and cut-out starters, which should be replaced for about every third lamp, at 72 cents each. Allowing 85 cents net for these two items for each replacement, and 37 cents for labor, the charge per month becomes 13 cents (800 hours-7500 hours times $1.22.).

Thus the total cost of the light from the two fixtures per month, is $1.60 + $1.17 + $ .13 = $2.90. Since the two workers occupy but 4 ft of the 4 ft 6 in. length served by the fixtures, the cost of light for the workers is (4 ft—4.5 ft times-$2.90) or $2.58. This amount ($2.58) is equivalent to that paid the workers for about 2½ minutes per day. In the absence of complete information about the plant, a full 3 minutes might be allowed to include a part of the lighting costs for aisles and public areas used by employees.

From this point on, it becomes a matter of judgment for the manager. Considering everything — visibility, speed of work, errors, fatigue, distractions, etc—is an expense of this proportion to payroll justified? As suggested earlier, one way to answer this is to consider that the payroll plus lighting is equivalent to paying for 483 minutes per day. Then he would consider 480 minutes work plus 3 minutes pay for light, or perhaps 482 minutes work plus the equivalent of 1 minute for ⅓ as much light, etc. Such an analysis puts the lighting cost into a proper perspective with reference to the payroll, both as parts of the production cost. The proportion would have been less had the lighting cost been related to total production cost.

### An Office Application

An interesting economic analysis of office lighting has been made by Robert L. Oetting, of the Lamp Division of General Electric Co.

The chart in Fig. 6 points out that, of the average cost of a typical office operation of $30 per square foot, $25 represents the portion needed for salaries and 25 cents that used for lighting.

On this basis, the lighting cost is equivalent each day to what is paid the employees for 4.8 minutes of that day. Considering the importance of good lighting in the office and this economic proportion, it is not surprising that what appear to be radical lighting improvements are so frequently made.

# INTEGRATED HANDLING
# Pays Off Big for Tocco Division

**By systematizing operations, including sheet metals work, electrical sub-assemblies, and final assembly this company was able to integrate truck, and bridge crane, and hoist handling . . . Nine months' production has demonstrated the wisdom of pre-planning materials handling**

OHIO CRANKSHAFT's new East 71st Street plant on Cleveland's South Side houses the Tocco Division, producer of the Tocco line of induction heating equipment. The new plant was designed to meet the needs of Tocco's rapid expansion—output has tripled since 1948. The new 100,000 sq ft building affords a total of 72,000 sq ft of manufacturing area, with the balance used for engineering and office personnel.

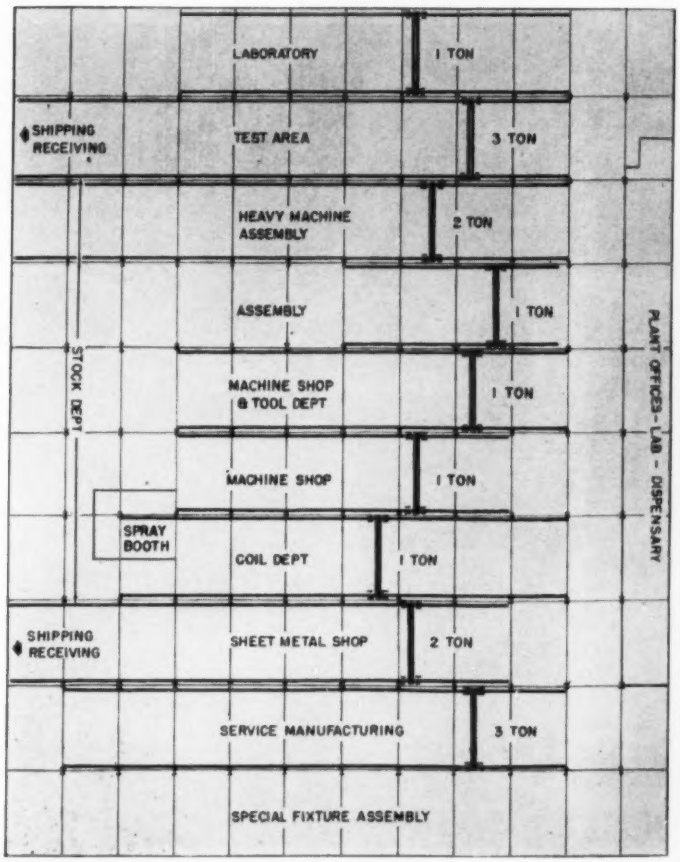
Tocco is a leading producer of high frequency equipment which includes heat stations, control panels, inductors, and such auxiliary equipment as quenching devices, required for metal heating, and automatic product handling devices. While this equipment is highly specialized, involving as many as 7000 parts in a single machine, manufacturing for the most part is done on a production line basis. However, tooling and special handling auxiliaries are individually designed and produced to meet special customer requirements.

### Specific Work Areas

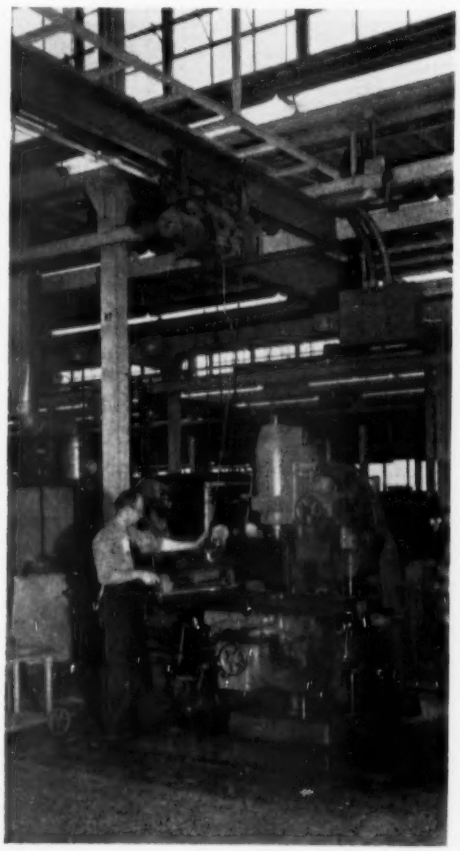
Systematizing operations, which include sheet metal work, machining, electrical sub-assemblies, and final assembly, was the first step. This was done by setting up specific work areas within individual floor bays separated by the structural columns of the building. Tramrail cranes are employed in these areas to give maximum hook coverage. This meets the plant's needs for east-west coverage in the manufacturing areas. Transverse handling between bays and from parts storage to assembly is done by industrial truck, completing the flow pattern.

The plant is 300 ft long by 240 ft wide. Factory offices are located along the east wall, while the parts department occupies an area extending two-thirds the west wall.

**Skeleton outline of the new Tocco plant shows how well the tramrail cranes are laid out to cover the entire production and testing areas**




**A one-ton hoist is used with the crane in the machine shop to handle jigs, as on this miller**



Shipping and receiving doors are located at extreme ends of this wall on each side of the stock room.

Operations progress in an orderly fashion from the south end to the test bay and shipping area at the north end. The first bay at the south end is reserved for servicing. Equipment is received at the south dock and is spotted into position by tramrail crane for inspection and servicing. This area is also being used to receive and store sheet metal cabinets fabricated by outside suppliers. It is interesting to note that the cabinets are equipped with eye bolts on top, so that they may be handled by crane in subsequent operations.

The cabinets are moved by truck to the second bay which is the sheet metal shop. Here brackets and fixtures are welded in and cabinet detail completed. The cabinets are moved to a cascade-type spray booth located opposite the adjoining No. 3 bay. As the cabinets are completed and painted, they are moved to either the light assembly or heavy assembly departments in the 6th and 7th bays, or are returned to the 1st bay to await requisition.

All coil work, inductor block assembly, and some transfer work is done in the Coil Shop in the No. 3 bay which adjoins the sheet metal shop. This involves brazing, soldering, and considerable handwork on blocks and transformers which sometimes weigh as much as 500 lb. Tramrail crane service in the section minimizes incidental manual handling which otherwise would be required to position awkward parts for bench work.

The next two bays (4th and 5th) are occupied by the machine shop. Castings are finish machined. Shafts, splines, and other parts are produced here for quench and handling devices. Finished parts from the Coil Department and the Machine Shop are sent to the stock room to await requisition for assembly. Coil and inductor assemblies and other parts for a complete station are requisitioned in a unit order. The material is gathered and loaded into a skid box which is moved to the assembly position in the 6th or 7th bay assembly area. In the meanwhile, the cabinet completed and painted in the sheet metal department is moved to the assembly area where it is picked up and spotted by the bridge crane.

In the light assembly area where only the control panels and heat stations are fabricated, electrical control assemblies are produced along one side and are wired into the cabinets on the other. Crane and hoist are used frequently for lateral movement of heavy sub-assemblies to the cabinet. The completed cabinets are carried from the assembly position by crane to a truck which moves the unit to either the final test area, or to heavy assembly in the adjoining bay where quenching devices or automatic product handling fixtures are added.

Before the completed machines may be shipped, engineering personnel put each unit through rigid tests. This is done in the test department in the 8th bay. The units are ready for shipment at this point, and can be moved by crane directly to the shipping dock at the west end of this bay. The 9th bay, equipped with a variety of Tocco machines, is reserved for laboratory work with customer products. A variety of products are tested daily on Tocco induction heating units so that production recommendations can be made.

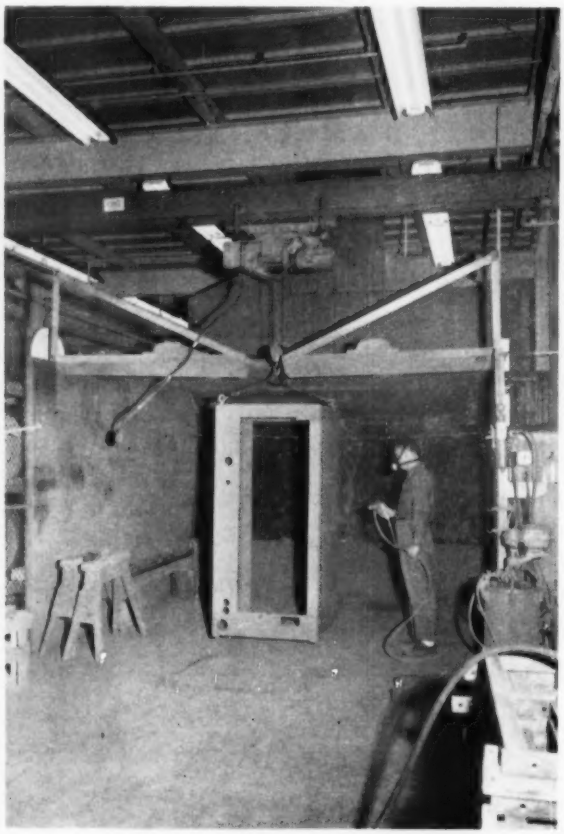
## Coverage and Mobility

Movement of materials in the plant, as can be seen by the method of manufacture, requires equipment that provides maximum area coverage and greatest mobility. For this reason, Ohio Tramrail cranes were installed in each bay.

The crane runways, east-west, extend the 100-ft length of each

**Convenience of an electric hoist and crane to position induction transformer in cabinet is readily apparent here**

**Tramrail crane used to carry cabinet into spray booth. Slot in top of the booth facilitates handling of the cabinet**



building columns. In the Coil Department and Test Department in the 3rd and 8th bays, the runways have been extended. In the former, the runway is extended over the aisle to cover the spray booth. In this instance, the crane is used also to carry the large metal cabinets into the booth in position for painting through a slot made in the ceiling of the booth. This makes it easy for the paint booth operator and eliminates extra handling of the painted cabinet which could mar the finish.

The crane runway in the test bay is extended across the west aisle. Here the runways have been extended to the west wall to give complete coverage of the shipping and receiving entrance. It is interesting to observe that in every instance, the company found it advisable to install three-ton capacity tramrail runways, even though hoist capacities vary according to the load requirements in each bay. This was done so that in the event of future expansion, the runways would be of suitable capacity to support several tramrail cranes.

The one runway and bridge of each crane is equipped with Ohio shielded safety-type electrification to carry power to the electric hoists. Current conductor bars for the 220 volt, 3 phase system are carried in an independent insulated housing tack welded on 40-inch centers to the bottom side of the crane runway and bridge girder. Current collectors are located in a protected position inside trolley and end truck yokes above the load bar. This provides reliable trouble-free service with the maximum safety for all operating and maintenance personnel. By employing undersling single-girder cranes and short wheel base hoist trolleys, end approach on the bridge premits maximum hook coverage. Both runways of each crane are flexibly suspended, which permits free-rolling by preventing binding of the crane wheels.

### Hoist Capacities and Use

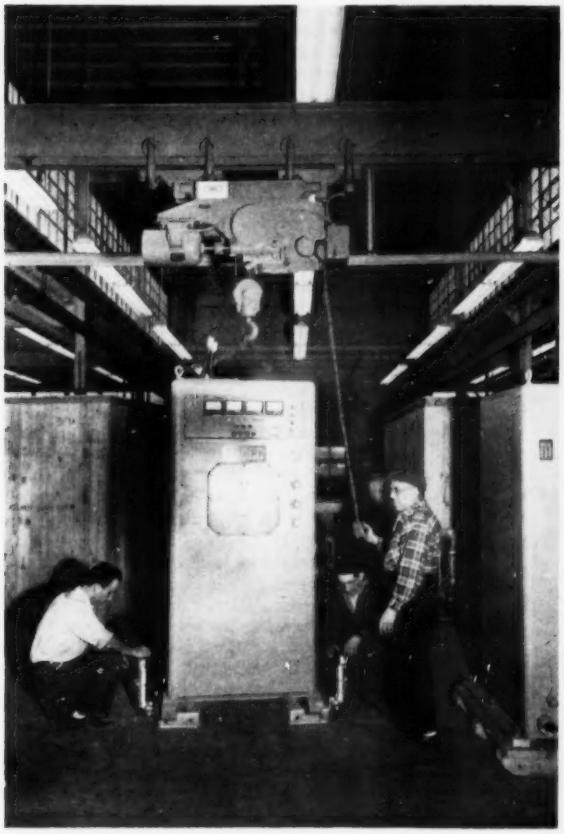
As mentioned earlier, the electric hoists with two-button pendant control, were selected for the specific service required in each bay's manufacturing operations. In the 1st bay (south) where customer equipment is received, a three-ton hoist is used. In the adjoining sheet metal shop, a two-ton hoist is used to handle the lighter loads.

One-ton hoists are used in the coil department, machine shop bays, and light assembly area, due to the light, miscellaneous handling encountered in these operations. A

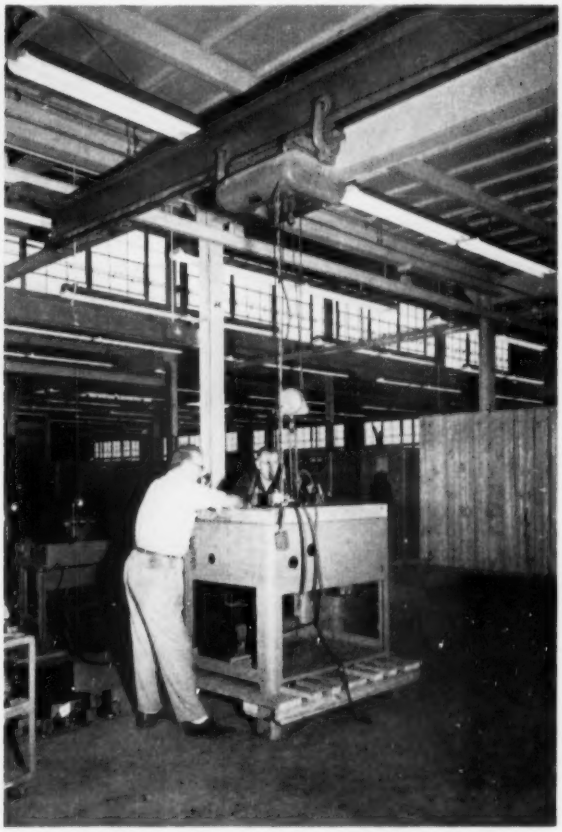
two-ton hoist is required in the heavy assembly area to position the larger units and to aid in assembly of special auxiliary equipment. Again, due to the fact that the Test Department must handle all equipment before it is shipped, a three-ton hoist is used here. In the last bay where customer products are tested, a one-ton hoist has been found sufficient for the operations involved.

Use of the dual handling system involving trucks and tramrail cranes to service these areas has resulted in orderly movement of materials in process. The cranes have enabled the skilled Tocco workmen to accomplish all required parts movement without the fatigue of lifting, and without delay of waiting.

**From its position in final testing department this control panel is moved to shipping where it is being weighed**



**The two-ton crane in the assembly department is used to both position and support heavy parts and sub-assemblies**



# MODELING CLAY
# The Plant Man's Inert Little Helper

By F. E. RILEY, Mechanical Engineer

IT MAY SEEM a bit incongruous that grown men, in a masculine profession, could find use for modeling clay ordinarily reserved for children. It does, nevertheless, have many uses in the plant.

Apart from the fact that the clay is always plastic and can, therefore, be reworked between the fingers for further use, it has the further property of adhering firmly to any dry surface from which it is generally removable without after-traces. Smears of the clay can be removed from hands and surfaces of work with a little gasoline. The plasticity of the clay can be increased by the application of gentle heat or by the working-in of small amounts of petroleum jelly.

The adhesive properties of the clay are useful for the temporary sticking of two parts together and a useful workshop application of this feature is illustrated in Fig. 1. In this, it is desired to align the marked circle on the workpiece gripped in the lathe chuck with the axis on the lathe center line. A piece of clay enables this to be done very easily as it allows a common domestic pin to be stuck to the tip of a twist drill or other cutting tool. The pin point is brought into close proximity with the circle inscribed on the work which can be trued to a fair degree of accuracy by using the pin as an indicator.

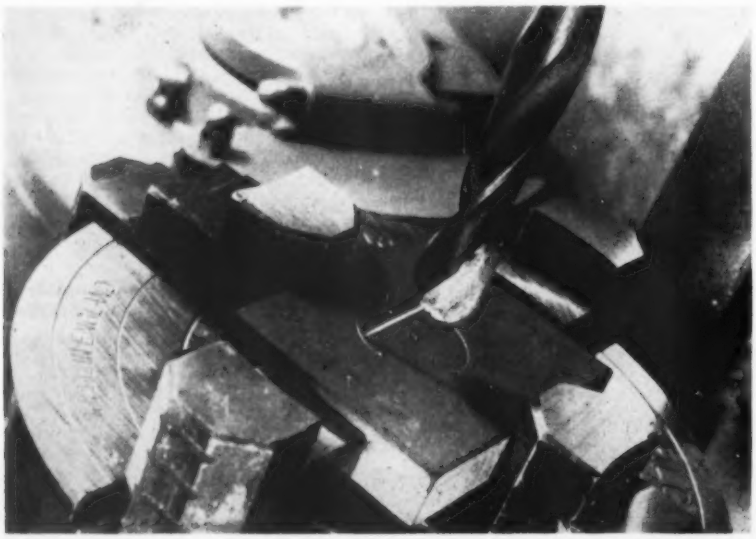


Fig. 1. A common pin stuck like this on a twist drill can help in good alignment

Fig. 2. Temporary method of providing accurate control of small lathe travel

The same idea can be used for aligning marked-out circles with the center lines of drill press spindles. Straight scribed lines on work which has to be shaped or milled can be aligned with the shaper ram or machine table line of travel by using a pin stuck to the cutting tools with a lump of clay. In lathe work, the pin is used for truing bar work gripped in the chuck; the pin bears on the exterior of the revolving work and indicates the high spots thereon.

A temporary method of providing accurate control for the travel of a small lathe saddle is shown in Fig. 2. In this example, a short steel rule is stuck to the top surface of the lathe slides with two lumps of clay. A simple steel-rod pointer with a bent-over end is secured to the top surface of the lathe saddle by means of a further two lumps of clay.

As the lathe saddle is traversed along the lathe bed, the pointer travels along the rule and on it can be read off the distance traveled. This travel control is very useful where a job held in the lathe chuck has to be bored out with a series of stepped diameters. The distance that the boring tool has traveled into the work can be seen at any time during the actual cutting by observing the position of the pointer.

Both pointer and rule can be re-set easily so that the start of the hole is indicated by the pointer being in alignment with the end of the rule. Errors arising from the operator having to add or subtract dimensions are thereby avoided; the rule indicates the actual depth to which the boring tool has penetrated the job.

Maintenance and assembly work can be assisted and made easier if a supply of modeling clay is available. A method of placing socket head screws into awkward locations is illustrated in Fig. 3. It is desired to place the socket head screw shown into a tapped hole flanked on either side by pulleys and gears. The space available is not sufficiently wide to admit an average size hand. Placing the screw and starting it in the tapped hole is facilitated by securing the screw head and the hexagon wrench

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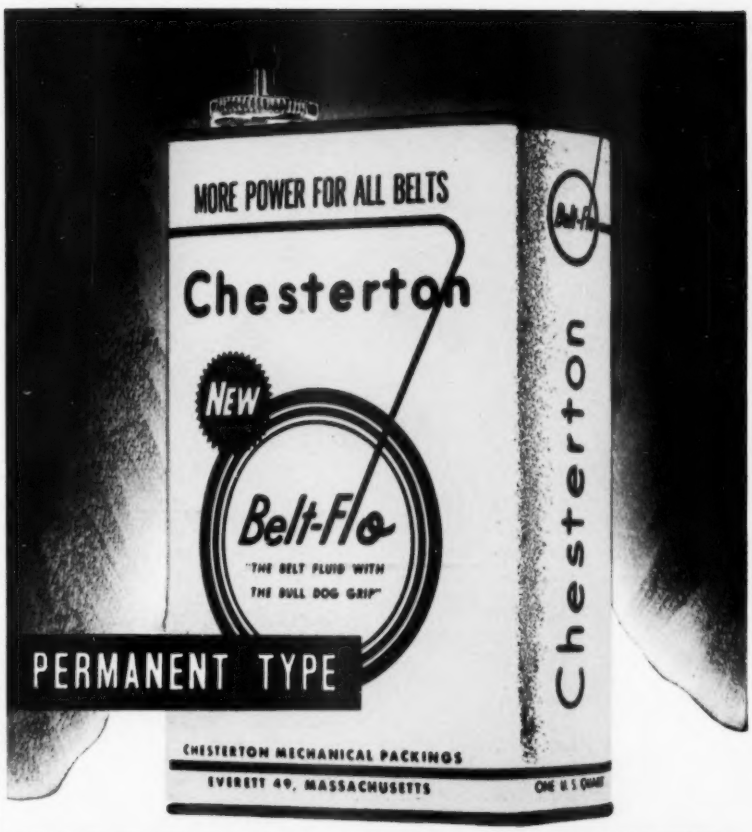


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Fig. 3. Holding socket head screws onto hex wrenches for inaccessible locations

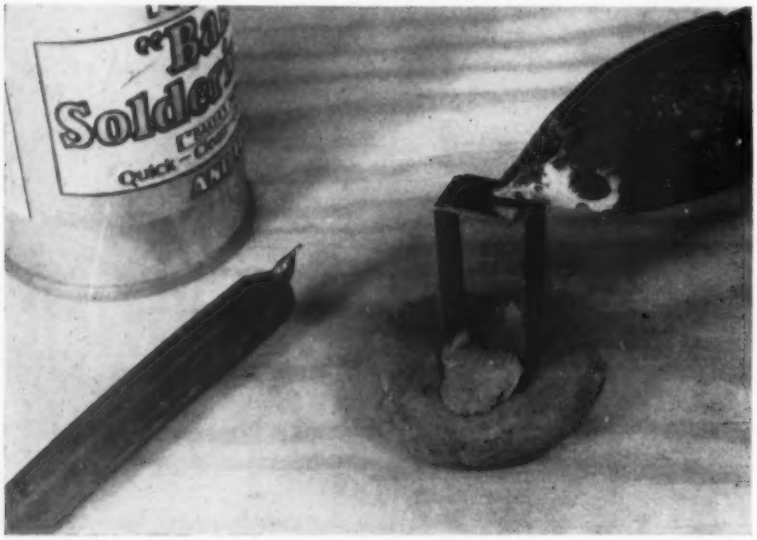
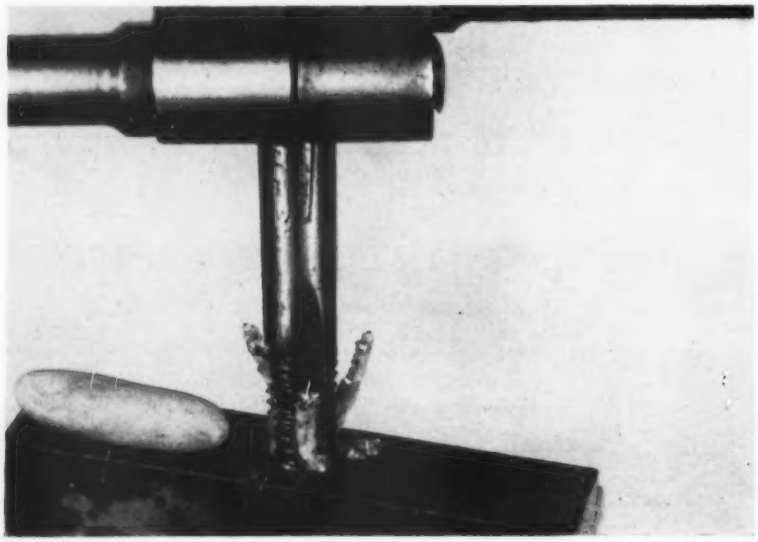


Fig. 4. Above: Holding small parts. Fig. 5. Below: To keep blind holes clean



together by means of a lump of clay. The extended length of the wrench allows the screw to be placed in position without fumbling and possible loss in the bowels of the machine.

If small parts are dropped into inaccessible positions, they can be fished out by placing a dab of clay onto the end of a rod and using this to fish for the dropped part. When located, a downward push with the rod will cause the lost part to adhere to the clay on the rod, permitting it to be withdrawn from its hiding place.

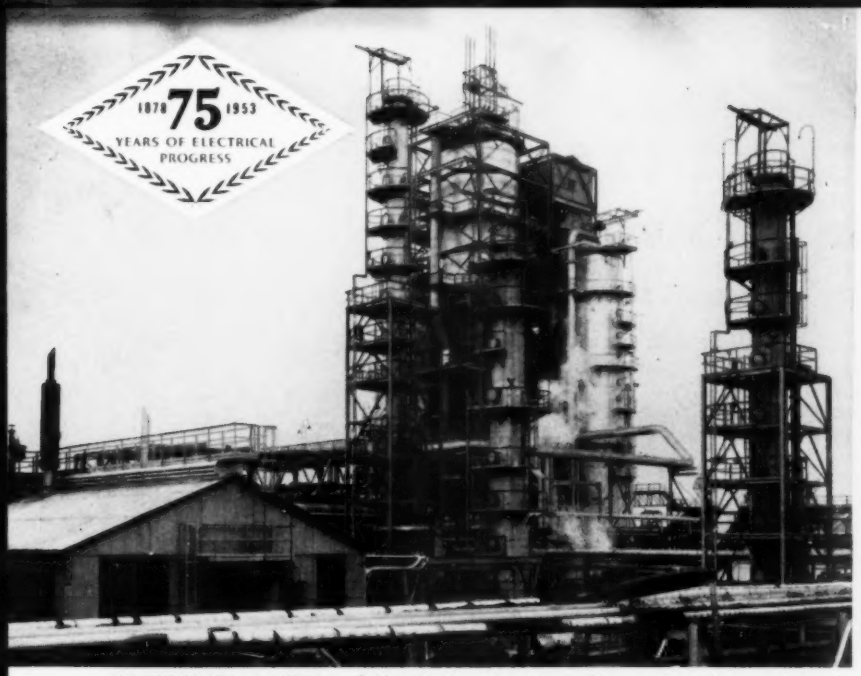
Modeling clay is a mechanically inert material, that is, it has little internal resilience and can be relied upon to stay put in any position into which it is pushed or molded. This property, coupled with its adhesive powers, makes it particularly suitable for holding two pieces of material in juxtaposition for soft or hard soldering. A typical example is shown in Fig. 4 in which two parts of an experimental job are to be soft soldered together. One end of the parts is anchored into a cake of the clay which forms both a stand or support and a clamp. The parts can be adjusted easily in relation to one another for accurate soldering.

The same idea can be used on the surface plate where awkwardly shaped castings and the like are to be marked out. The casting is bedded down into a large lump of clay which will support it in any position desired so that marking-out with reference to the plane of the surface plate can be carried out.

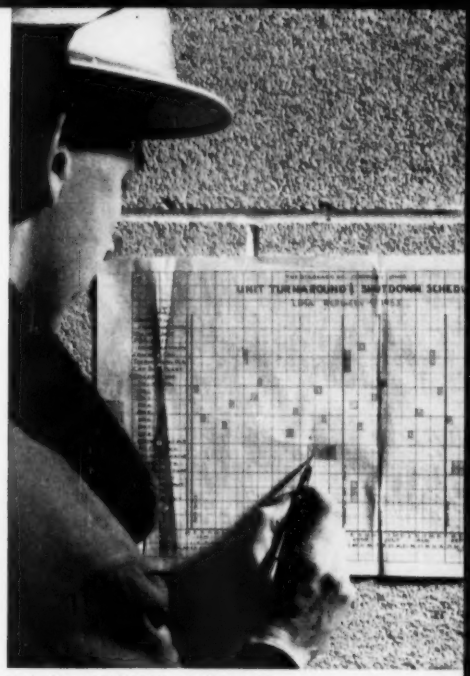
The clay has uses as a cleaning material. For instance, magnetic chucks, as used on surface grinders, retain magnetized particles of hard steel which are in the form of grinding dust. These prove difficult to remove by conventional methods. Dabbing the contaminated surface with a lump of clay causes the particles to adhere thereto for removal from the surface of the chuck. In a similar manner, magnetized work which is covered with ferrous particles can be cleansed thoroughly by this method. Some polished surfaces would be scratched if particles of metal or broken glass were swept off with a duster or brush.

The retaining of small particles by the clay can be used in the tapping of blind-ended drilled holes. The hole to be tapped is filled with a piece of clay which has been previously rolled to a suitable shape and size for fitting in it. Fig. 5 illustrates this. The hole is tapped in the normal manner and as the tap penetrates deeper into the drilled hole, the clay is displaced and is extruded up the tap flutes and carries with it the particles of swarf produced by the cutting edges. The tap can be screwed into the hole until it butts against the bottom. Unscrewing the tap brings out the remainder of the clay, together with all the remaining swarf. The resulting hole is perfectly clean.

The foregoing are but a few of the uses, to be found daily, for modeling clay in the workshop.




**MAINTENANCE IS VITAL** in Sohio's highly automatic cracking process that requires only six men per shift. New Lima, Ohio plant operates around the clock, runs 16,000 barrels per day.



**YEARLY OVERHAUL SCHEDULES** are posted in key areas so that plant operating and maintenance personnel can project their requirements ahead.

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**SPECIFIC EQUIPMENT OVERHAUL** is scheduled by plant area in this master book. Equipment is keyed to central file (below) by equipment record numbers.

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# HYDRAULIC CIRCUITS
## And Their Industrial Applications

By H. L. STEWART, Special Engineering, Logansport Machine Co., Inc., Logansport, Indiana

WHILE HYDRAULIC SYSTEMS have more than proven their worth in solving a great many simple and complex linear and rotary motion problems, the new applications which arise daily really tax the imagination and ingenuity of the hydraulic circuit designers.

One problem has stumped the experts for a long time and that is moving the pistons of two hydraulic cylinders of the same nominal bore in perfect unison. It seems that if oil pressure is transmitted from the hydraulic lines to two cylinders which are hooked in parallel the pistons should move in perfect unison. There are many variables which must be taken into consideration. These variables are as follows:

1. Piston Leakage—If one piston shows more leakage than the other, then the piston movement will be unbalanced. It is very difficult to obtain a perfect seal with a ring type piston. The use of cup packing, "O" ring, or chevron type seal for the piston is recommended where leakage must be practically nil. This is especially helpful when flow equalizers are used.

2. External Leakage—This is a factor to consider at the pipe or tube fittings and at the gasket surfaces of the cylinder and valve covers. A slight leakage at one gasket on a cylinder or at a pipe connection could easily upset the unison movement.

3. Friction of Packing—It is practically impossible to build two cylinders commercially so that both will have the same amount of friction from the packing. Even if the rod gland of one cylinder is pulled up slightly more than the other, there may be considerable difference in the friction between the two rod packings. If the packing friction is much greater in one cylinder than the other, it is likely that the piston of the one with the least friction will move to the end of the stroke before the other piston will even start to move. This can be overcome by carefully adjusting the tension on the packing.

4. Internal Valve Leakage—If flow equalizer valves are used, they must have a minimum of leakage. If there is any degree of difference in their leakage, it will certainly cause unequal movement. When their equalizing parts become worn they should be quickly replaced.

5. Bore Size of Cylinders—While the bore size of commercially built cylinders may have a nominal bore size, the bores of two cylinders may vary 0.010 or 0.015 in. depending upon machining conditions. In a long stroke cylinder, even if you had a perfect equalizing device, the volume between the two cylinders would be somewhat different, which would affect the speed of the pistons.

6. Condition of Oil—If flow control valves are to be the equalizing means, the oil must be free of lint and other foreign particles. Clogging of a flow control needle would quickly change the speed of the piston movement. Some protection should be afforded to the flow controls on fine feed applications.

7. Heat—Heat is another factor, especially if one cylinder is subjected to excessive heat and the other is not, which may often be the case. The viscosity of the oil may change considerably which would really have its affects upon the unison operation.

The following circuits are an approach to the solution but they are not the perfect answer. They will, however, suffice in nearly all instances.

### Use of Rack and Pinion Design

This circuit, Fig. 1, is one of the most positive approaches to the problem of moving two cylinders in unison. However, if space is at a premium there may be some objection as the racks must be as long as the cylinder strokes. When the cylinder piston rods are moving in the same direction, the pinions are connected to each other by a sturdy tie bar suitable of withstanding the torque created by piston movement. If the cylinders are at 90 deg to each other or at some other angle, then the use of the rack and pinion design becomes quite complicated and may prove of little or no value due to costs involved.

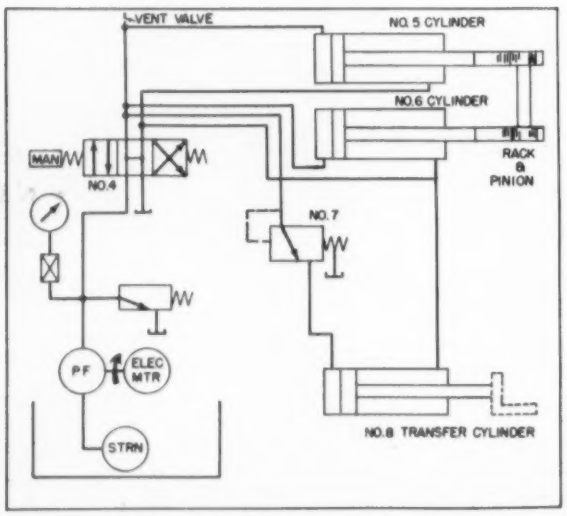



Fig. 1. Circuit, using rack and pinions, is one of the most positive methods to problem of moving cylinders in unison

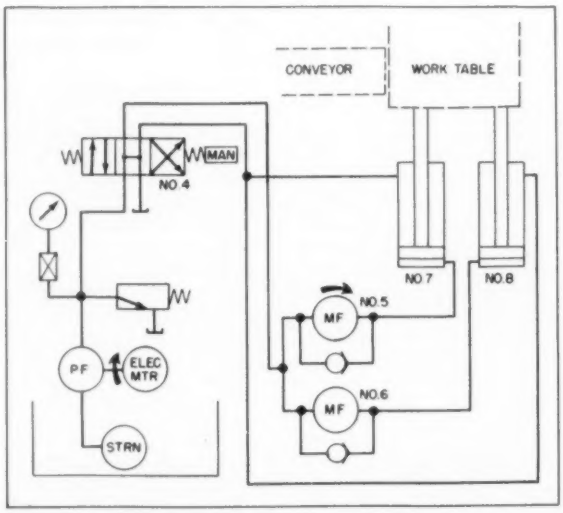
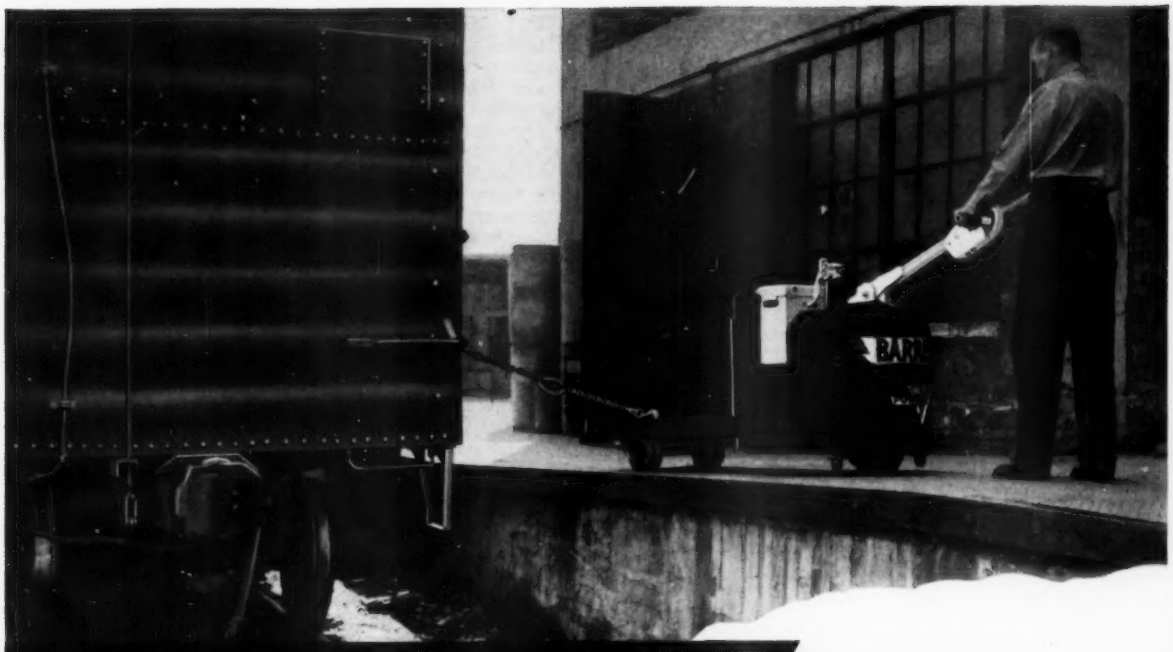



Fig. 2. The use of equalizers in a circuit is quite satisfactory, especially if volumes which are involved are not too great



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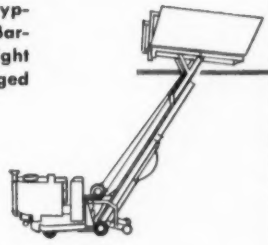

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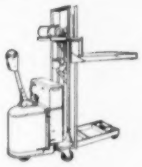

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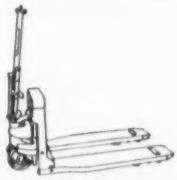

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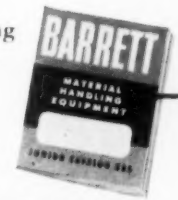


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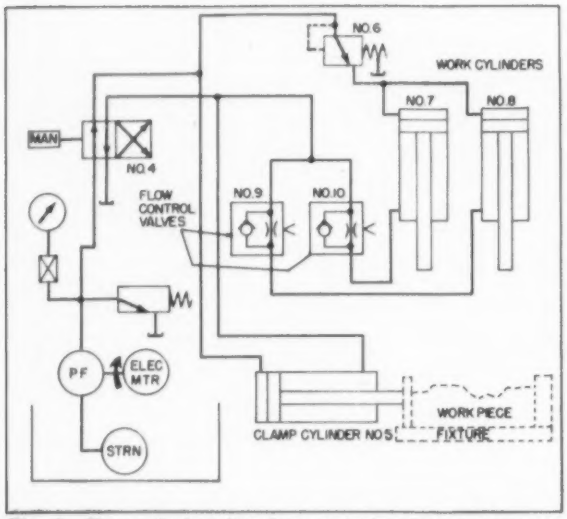


Fig. 3. The method, using flow control valves, is accurate enough for many applications and is inexpensive to set up

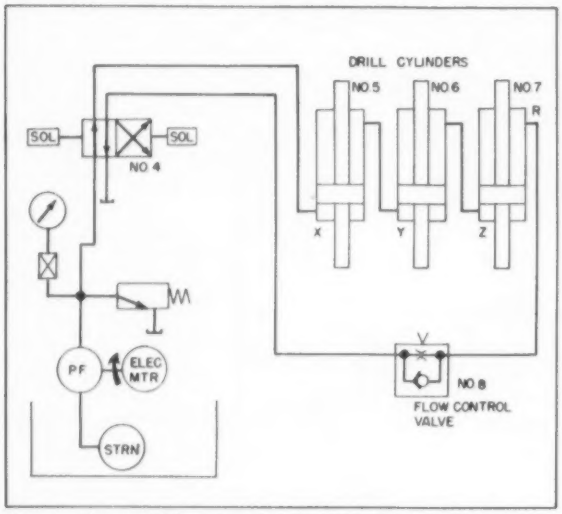


Fig. 4. Circuit with cylinders in series is suitable for many applications. Precaution must be taken to eliminate leaks

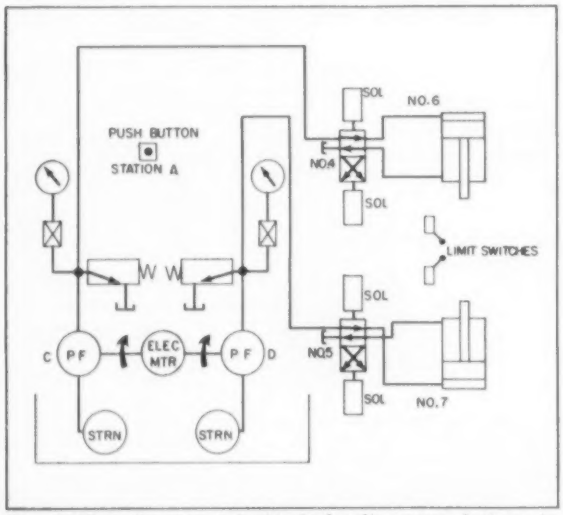


Fig. 5. With the use of double hydraulic pumps, leakage in all components must be at minimum for satisfactory results

The circuit shown performs as follows: Operator fills tables with workpieces.

Operator shifts handle of master four-way, three position, open center valve No. 4, allowing oil to flow to blind end of cylinders No. 5 and No. 6. Force of oil moves piston forward. Ends of piston rods are equipped with racks and are riding on the pinions which are connected together with a tie bar which causes the pistons of the cylinder to move forward together.

At the end of the stroke of cylinders No. 5 and No. 6, pressure builds up, sequence valve No. 7 opens and oil pressure flows to blind end of transfer cylinder No. 8. Piston and rod of transfer cylinder move forward removing workpiece from table.

Operator shifts handle of valve No. 4 and oil flows to the rod end of all three cylinders, returning the pistons to their original positions. Operator must keep one of his hands on handle of control valve No. 4 at all times during the movement of cylinder pistons, or springs will shift the piston of the valve back to neutral position, causing cylinder pistons to stop and the line pressure will exhaust back to the power unit reservoir.

## Use of Equalizers

This method, Fig. 2, is quite satisfactory, especially if the volumes involved are not too great. Most equalizing valves have fairly small capacity. These valves are primarily a measuring means for dividing the flow of oil from the pump into two equal parts and directing half to each end of the two hydraulic cylinders. Changes in the loads have little affect on this type of unison movement.

Two fluid power motors of the same capacities also can be used as equalizers by coupling their shafts together. By the use of any type of equalizers the cylinder bores must be as close to identical as possible and the pistons of the cylinders must be packed so as to eliminate leakage.

The circuit functions as follows: Workpiece moves onto table from conveyor.

Operator shifts handle of four-way, three position, spring centered control valve No. 4. Oil flows to fluid motors No. 5 and No. 6 which separate the oil equally. The oil then flows to the blind end of pusher cylinders No. 7 and No. 8.

Oil pressure advances the piston of pusher cylinders at same rate until end of stroke is reached.

Operator shifts master control valve No. 4, oil flows to rod end of pusher cylinders No. 7 and No. 8, and pistons return to original position.

Operator releases valve handle, allowing valve piston to return to neutral position, and oil flows to sump at zero pressure during standby period.

## Flow Control Valves

By the use of flow control valves, Fig. 3, the exhaust oil from the cylinders can be metered with a fair degree of accuracy to give unison movement to the cylinder position. Variables such as leakage, friction, heat and loads must be kept as nearly uniform as possible if fairly accurate results are expected. Of all methods shown this is usually the least accurate, but this method is accurate enough for many applications and is inexpensive to set up.

The circuit functions as follows: Operator loads workpiece on fixture.

Operator shifts handle of four-way, two position, hydraulic control valve No. 4 and oil flows to blind end of clamp cylinder No. 5 and workpiece is clamped in place. When pressure builds up sequence valve No. 6 opens and oil pressure flows to blind end of work cylinders No. 7 and No. 8. Pistons of work cylinders move forward at a rate set by flow control valves No. 9 and No. 10. In order to make both pistons move at same rate needle in flow control valves must be adjusted carefully.

When pistons of cylinders No. 7 and No. 8 reach the end of their strokes, operator shifts handle of valve

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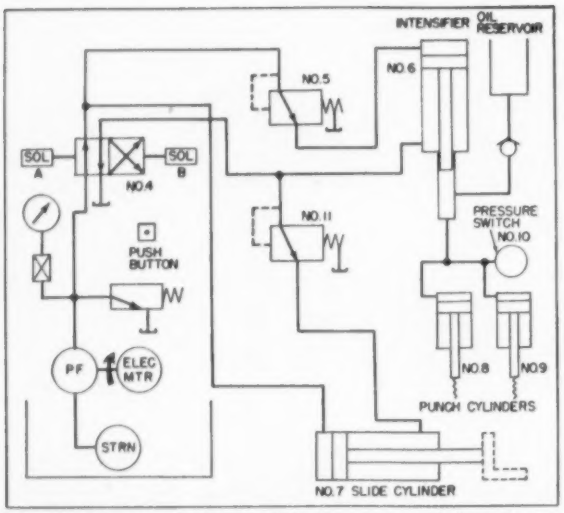


**Fig. 6. Circuit, using intensifier to punch cylinders, is employed where high pressure is required in a limited space**

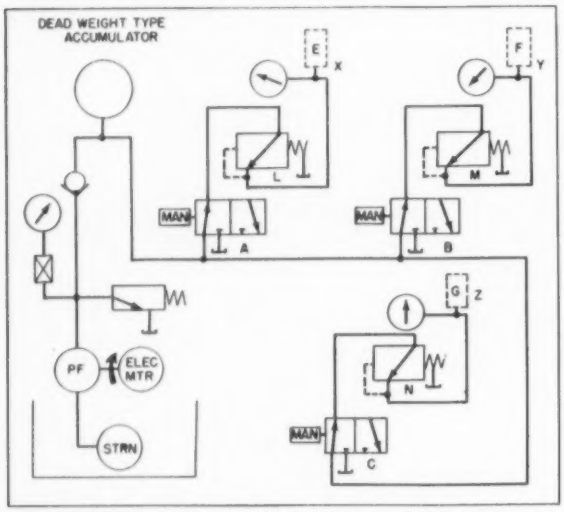


**Fig. 7. On accumulator and pressure reducing valve circuit, different pressures on valves are set for each workpiece**

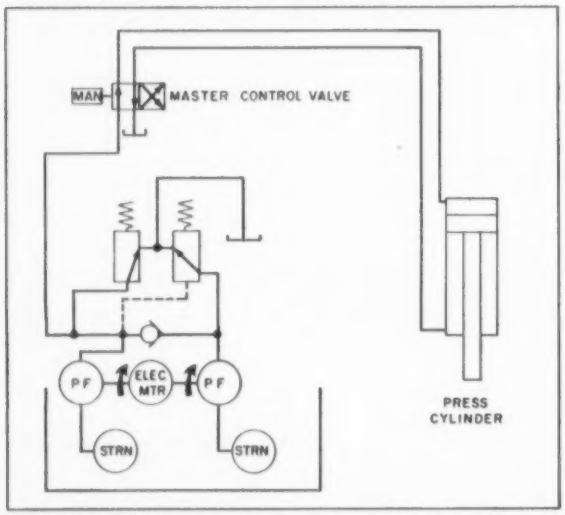


**Fig. 8. The high-low pumping arrangement for presses not only reduces heat but offers savings in hp consumption**

No. 4 to original position and oil flows to the rod end of all three cylinders. The work cylinders have large diameter piston rods so the oil forces the pistons back at a rapid rate. The speed control valves have built-in check valves which allow free flow in the return direction. The sequence valve also has a built-in check.

### Cylinders in Series

While this circuit, Fig. 4, is suitable for many applications it is cumbersome, and extreme precautions must be taken to eliminate both internal and external leaks. Any leakage at pipe connections, gasket surfaces, packing glands or pistons can disrupt the unison movement. The pipe lines must be full of oil and the system free of entrapped air. If the cylinder stroke is very long, the cylinders will take up considerable space due to the need for double end rod construction.

The circuit operates as follows: Operator places workpiece on drill press fixture and clamps work in place.

Operator trips push button of solenoid, four-way, hydraulic control valve No. 4 and oil pressure flows to port X of cylinder No. 5 which in turn forces oil to port Y of cylinder No. 6 and to port Z of cylinder No. 7 and the drill heads move down into the work uniformly at a rate set by flow control valve No. 8.

When cylinders No. 5, 6 and 7 reach end of stroke, operator shifts valve No. 4 to original position. Ball check is unseated in valve No. 8 and cylinders return to original position as oil flows in through port R of cylinder No. 7.

### Use of Double Hydraulic Pumps

A double pump or two pumps of the same capacity connected to the shaft of a double end electric motor have been used successfully when all conditions were favorable, see Fig. 5. Leakage in all components—valves, cylinders, and pumps—must be at a minimum to insure satisfactory results. The loads on each cylinder must also be the same.

The circuit functions as follows: Operator loads casting onto worktable.

Operator momentarily depresses electric push-button station A and four-way, two-position solenoid operated master control valves No. 4 and No. 5 shift allowing oil from each pump C and D to flow to blind end of work cylinders No. 6 and No. 7 respectively. Cylinder pistons move in and at end of stroke, two limit switches, which are hooked in series, are contacted and master valves No. 4 and No. 5 are shifted to their original positions thus completing the cycle. One operator can operate two or more machines since the cycle is semi-automatic. The only time the operator needs to be at the machine is to load and unload the work.

### Use of Multiple Pressures

Another problem which often arises is the use of multiple pressures in a single hydraulic system. The more complex systems usually contain numerous hydraulic components which may be required to operate at different pressures. A very good example of this is on a heavy duty press application which contains a large heavy duty ram cylinder, several light duty clamp cylinders, and a fluid motor for indexing the worktable.

If the operating pressure for the entire system were the same, the ram cylinder would be excessively large if operating pressure were based on one suitable for the clamp cylinders, or the clamp cylinders would be impractically small if the pressure were based on a suitable ram operating pressure. In either of these cases, the fluid motor would have to be operated at pressures which would not be suitable. Also pump volumes may be such that they would not be practical if extremely large cylinders were used.

In order to balance the system properly it is necessary that high pressure be used at one place in the circuit, medium pressure at another place and low pressure in the third place. When using one of the multiple pressure systems, heat, leakage and wear may be reduced

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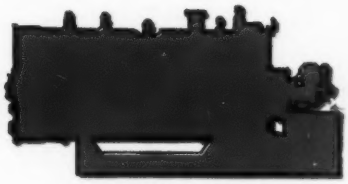

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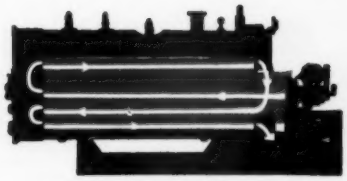

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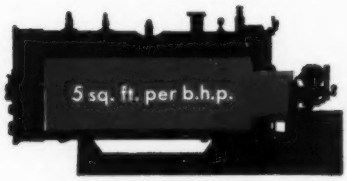


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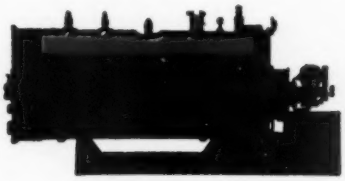

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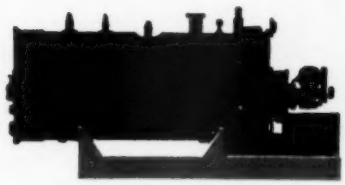

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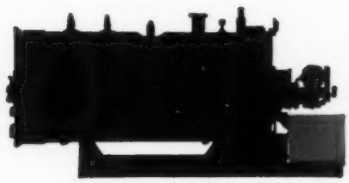

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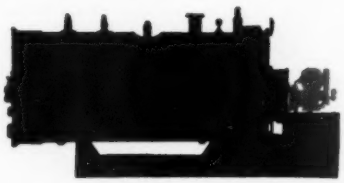

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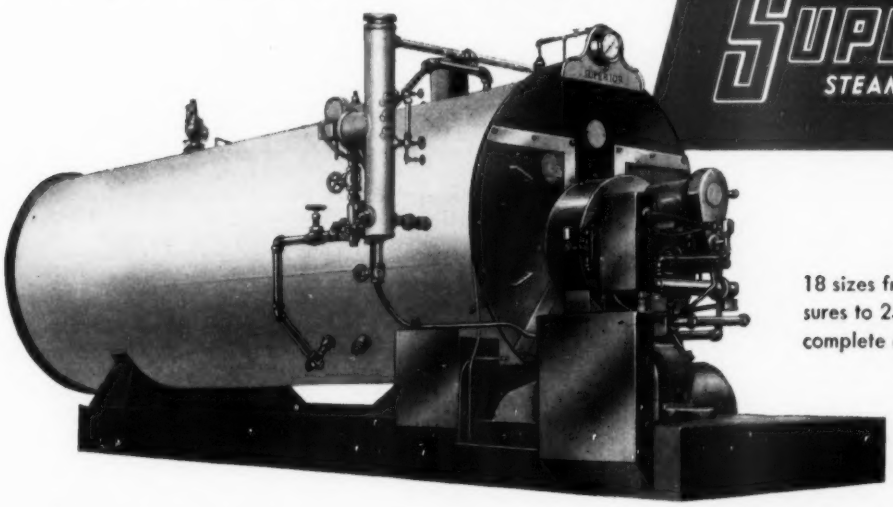

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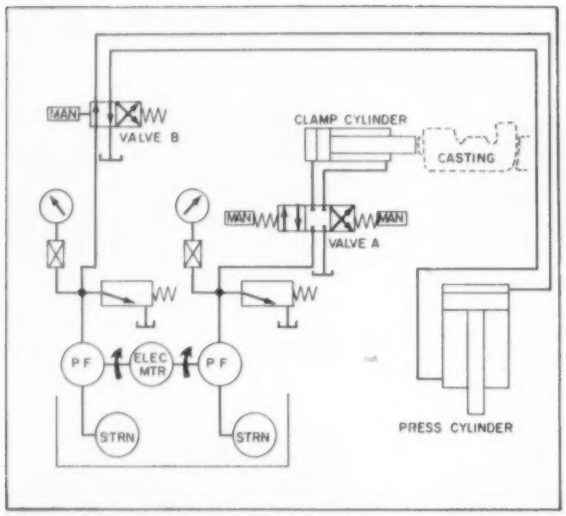


Fig. 9. By the use of a power unit with two separate pumps, a dual pressure system can be adopted for many applications

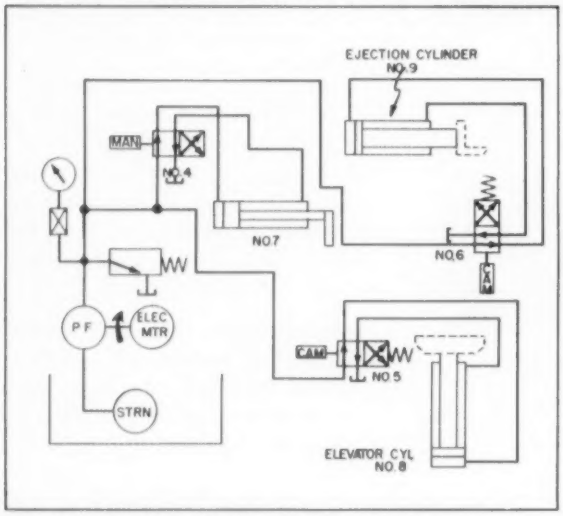


Fig. 10. Circuits with three master control valves assure positive sequencing, do not depend upon pressure build-ups

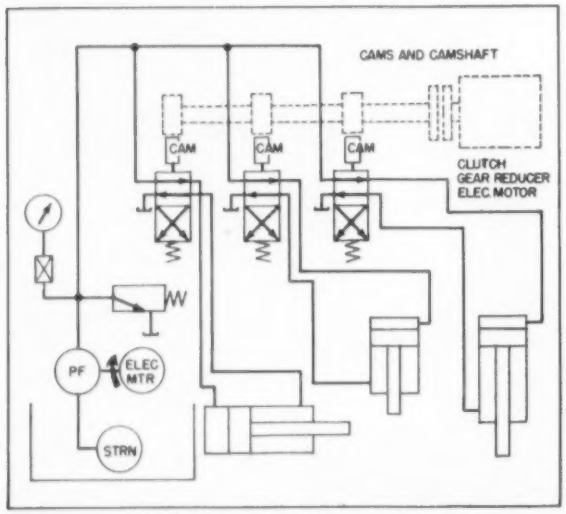


Fig. 11. By selecting a cam drive as the means of control, numerous cylinders may then be operated in sequence

to a minimum, and better service life may be expected from the various fluid components.

A number of methods may be employed to obtain two or more working pressures from a single circuit. These methods include the use of pressure reducing valves, individual high and low pressure pumps, combination pumps with changeover valves, pressure intensifiers and externally operated relief valves.

Some of the circuits which have been employed successfully are shown in the next four drawings.

**1. Circuit using intensifier, Fig. 6.**

Operator places work on slide cylinder table and momentarily depresses button on push-button station, energizing solenoid B of solenoid operated four-way, two-position valve No. 4, shifting piston and allowing oil pressure to flow to blind end of slide cylinder No. 7.

After piston of slide cylinder No. 7 moves to end of outstroke, pressure builds up, opening sequence valve No. 5, and oil pressure flows to blind end of intensifier, forcing intensifier piston forward.

Intensified pressure flows from end of intensifier to single acting punch cylinders No. 8 and No. 9. At end of punch stroke, full pressure builds up, closing pressure switch No. 10.

Closing of pressure switch No. 10 energizes solenoid A of valve No. 4, shifting piston allowing oil to flow to rod end of intensifier cylinder, retracting piston and allowing springs to return pistons of punch cylinders No. 8 and No. 9. to original position.

When oil pressure builds up, sequence valve No. 11 opens, returning piston of cylinder No. 7 to original position. Operator unloads finished pieces and reloads.

Intensifiers are used advantageously where high pressure is required in a limited space. High temperature is not generated in this method of supplying high pressure for long periods as in other methods. The disadvantage of the accumulator is that the application must be completed before the intensifier ram reaches the end of the stroke or the intensified pressure will be lost.

**2. Accumulator and pressure reducing valve, Fig. 7.**

Operator attaches workpieces onto pipe connections X, Y and Z. While operator is making the connections the power unit is delivering oil to the dead weight accumulator until its ram reaches the top of the accumulator stroke, then a limit switch is contacted which automatically shuts off the motor and pump. The check valve stops the accumulator from discharging back through the pump. Whenever the oil is drained from the accumulator another limit switch is contacted and the motor and pump go into action. The accumulator saves on electric power consumption and motor and pump wear.

Operator sets different operating pressure on each reducing valve to take care of pressure required for each piece.

Operator then shifts handle of valve A and a pressure of 600 psi is exerted on piece E. This pressure will remain on E until operation shifts valve handle back to original position. The same procedure is followed on valves B and C.

At end of that period operator shifts wall valve handle back to original position, allowing oil pressure to drain from workpiece. He then unloads and is ready for next cycle.

**3. High-low press circuit, Fig. 8.**

The high-low pumping arrangement for presses is very popular. It not only reduces the heat but offers considerable savings in horsepower consumption. For example a high-low pump, delivering 12.6 gpm at 300 psi and 1.8 gpm at 1000 psi requires a 3 hp motor. To get the large volume and high pressure from a single pump it would require a 7.5 hp motor.

Operator loads work in fixture and steps on pedal of foot-controlled, four-way master valve. Press ram approaches workpiece at high speed and low pressure.

When contact with workpiece is made automatic

(Continued on page 186)

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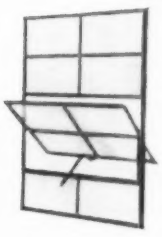

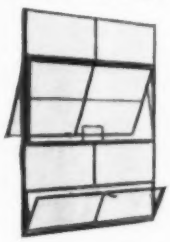

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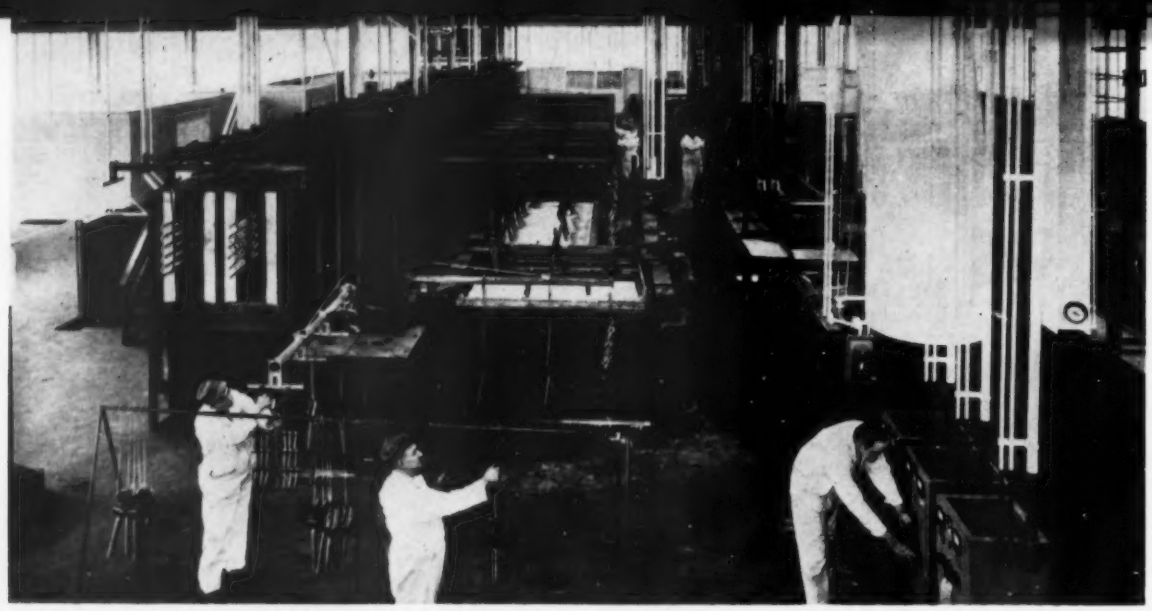


**Fig. 1. The fully-automatic, cadmium-plating conveyor makes mass production possible for a variety of electroplating operations. Items are loaded, then moved to the right through a succession of cleaning, plating and finishing treatments**

# ELECTROPLATING— Mass Production Takes Over

MASS PRODUCTION techniques have been introduced to job-lot electroplating in the new Swissvale plant of Union Switch and Signal Division of Westinghouse Air Brake Company.

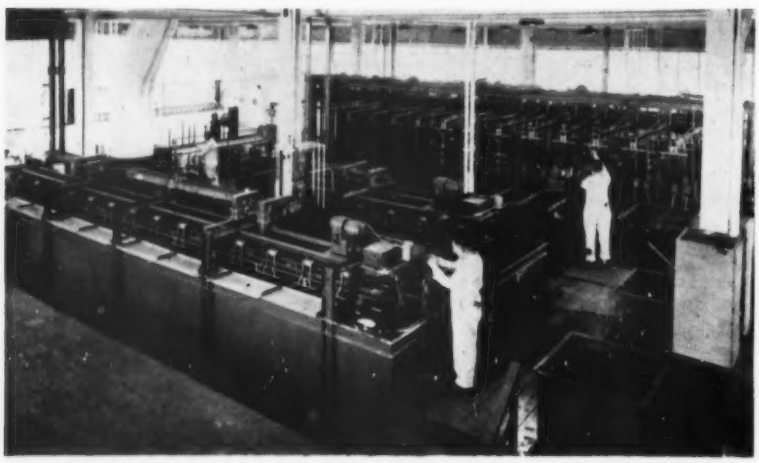
The equipment throughout the plant was installed on an assembly-line basis, with several conveyor systems to facilitate transfer of items from operation to operation.

Placed strategically in one section of the building are two fully-automatic and three semi-automatic plating conveyors. Close by, are the still-plating tanks that provide the individual attention some items require, and the cleaning, storage, plating lines and dryer of the barrel-plating equipment.

Of the two fully-automatic conveyors, the cadmium-plating conveyor is the larger—and is the machine that makes mass-production possible on a miscellaneous assortment of operations. Manufactured by the Hanson-Van Winkle-Munning Co., according to Union Switch and Signal specifications, this machine performs continuously and automatically all operations in the plating cycle—cleaning, rinsing, plating and drying.

Items to be plated with cadmium proceed through a cycle of 17 distinct treatments and return to the loading platform in less than 39 minutes. Tolerances as close as 0.0003 of an inch are achieved.

**Fig. 2. The cadmium-plating conveyor in the background performs all cleaning treatments for items which are then transferred to the semi-automatic copper- and tin-plating conveyors in foreground where they are plated with copper or tin**



The carrier arms of the cadmium-plating conveyor support three racks each, with all three racks proceeding simultaneously through seven cleaning and pickling treatments. After the seventh treatment, the outer rack is unloaded for transfer to either of two conveyors: the semi-automatic copper conveyor or the large, tin-plating conveyor for copper, tin or tin-over-copper plating. The other two racks continue though the ten remaining plating and finishing treatments.

While the cadmium-plating conveyor is of the elevator type with regard to moving parts, the other fully-automatic machine—the nickel-plating conveyor—is a chainless, return type, manufactured by the Udylite Corp.

The barrel-plating equipment includes facilities for plating copper, zinc, cadmium, nickel and tin on items handled in quantity, such as terminal nuts, bolts and screws.

The still-plating equipment, which will be installed shortly, will feature facilities for such special finishing treatments as iriditing, enthonizing, chrome deoxidizing, aluminum anodizing, bonderizing and parkerizing.

Rectifiers will be used to supply current to units of the barrel, fully- and semi-automatic equipment; still-plating units will be equipped with the conventional, motor-generator sets.

The building housing the installation is of steel frame, 90 ft wide, 200 ft long and 24 ft high with a 16-ft clearance. The outer walls consist of acid-resistant tile and brick to a

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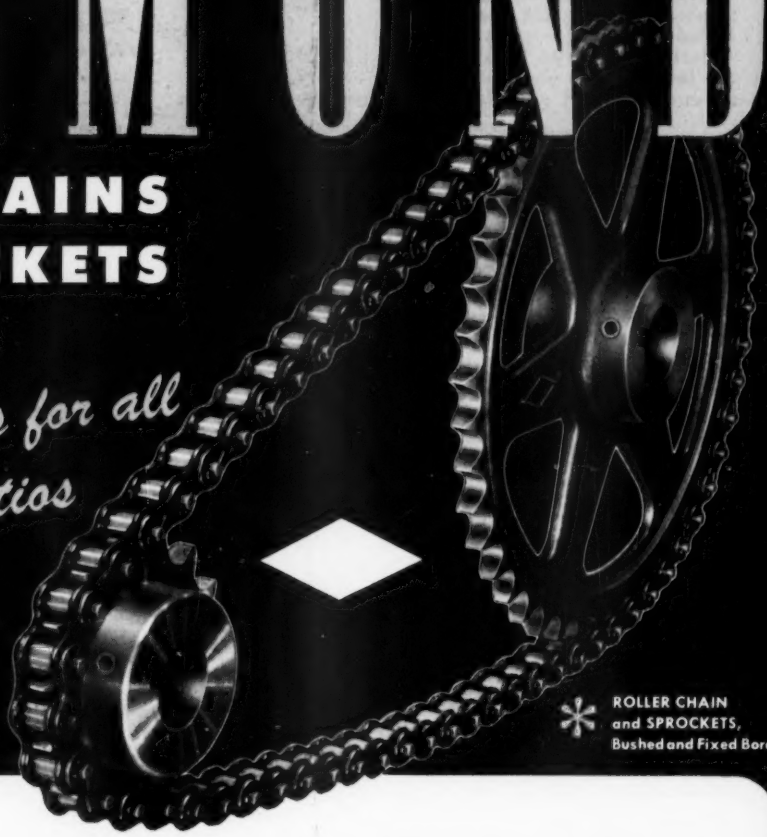

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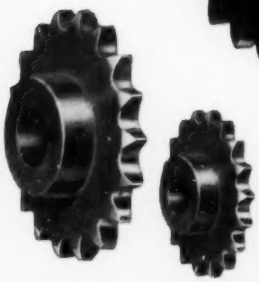

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height of 6 ft, followed by a continuous, blue-tinted corrugated glass and sheets of corrugated asbestos.

The roof is comprised of a layer of Kaylo, a hydrous, calcium-silicate, insulating roofing tile overlaid with asphalt-cemented roofing felt. Each material used in the construction of the building was chosen because of its anti-corrosive qualities.

### Acid-Proof Brick

Working and cleaning areas are covered with a floor of acid-proof brick, impervious to almost any chemical action. The cement holding them in place is of a varied composition, since the nitric, sulphuric and hydrochloric acids and numerous alkalis used in the cleaning treatments each have their own peculiar corrosive qualities.

Floor trenches run alongside the tanks to drain away overflow.

The ventilation and heating system was designed to circulate, heat and replace a maximum of 300,000 cu ft of air per minute. Heating fans prevent drafts and help maintain an even temperature throughout, with general ventilating fans removing half the air, and individual exhausts on the plating tanks the other half. In addition, air louvers, complete with finned coil heating units, are located in two of the outer walls to heat the incoming air.

To heat the building properly and to protect the coils from freezing during cold weather, dual-controlled thermostats have been installed. These thermostats help maintain desired temperatures and also restore steam flow to the coils when the outside temperature drops to a freezing level, regardless of inside temperature.

During the daylight hours when the heating units are in operation, they economically utilize the exhaust steam from the forge shop's steam-operated drop hammers. During the night, they employ live steam supplied by the nearby power house.

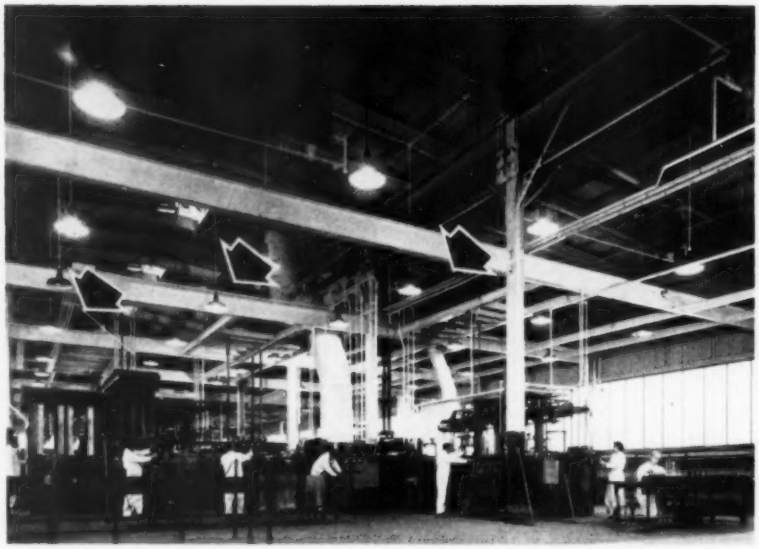


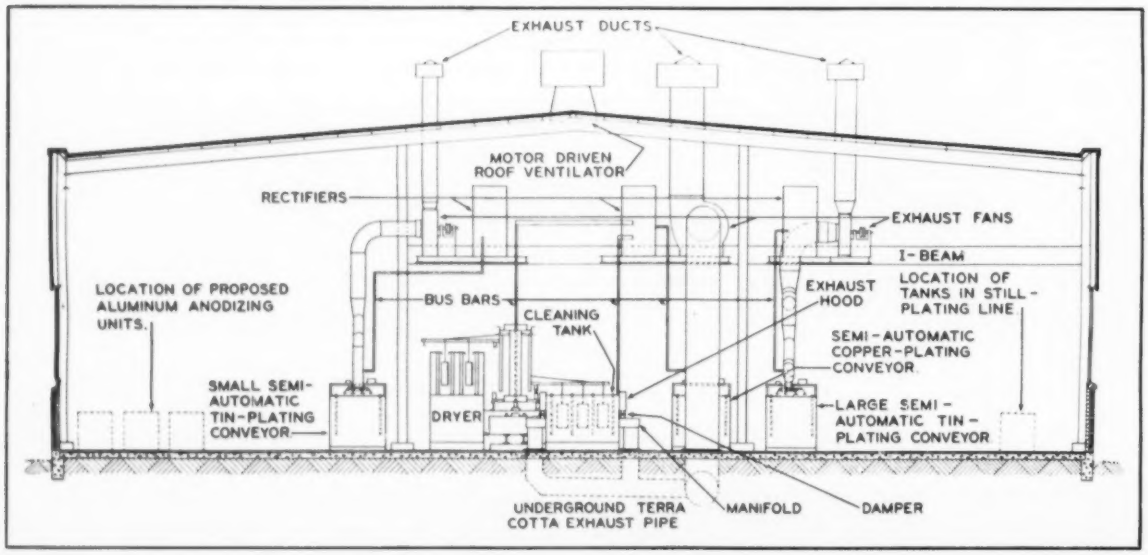
**Fig. 3. The overhead rectifiers (arrows) supply power to the fully- and semi-automatic and barrel-plating equipment. The conveyor at left is for cadmium-plating; the fully-automatic conveyor at right is for nickel-over-copper plating**

Since normal wind dispersal is sufficient to counteract any fumes in the exhausted air, except nitric oxide, there is no danger of contaminating the atmosphere around the building. A water alkali solution is employed to wash down the air before exhausting and to neutralize the nitric oxide. Windows have been eliminated to enable the ventilating system to operate at peak efficiency, and doors are kept closed whenever possible.

To conform with Pennsylvania's pure streams act and the rulings of the Allegheny County Sanitary Authority, every tank is connected to an intricate down-draft exhaust system.

Fumes in these tanks are drawn down through the floor by individual vents and emptied into a network of large, underground terra cotta ducts. There, because the ducts are at a low temperature, the moisture in the fumes is condensed and emptied into the sewer system. The air within the ducts flows counter to the condensed moisture and is led up through a system of fans to the outer atmosphere. Each underground duct is fitted with an individual trap to prevent any air from the sewer system re-entering the exhaust system.

**Fig. 4. This diagram illustrates where the overhead rectifiers are located, also where exhaust fans, ducts and the underground ducts of the down-draft exhaust system are linked to the tanks in the fully- and semi-automatic plating areas**



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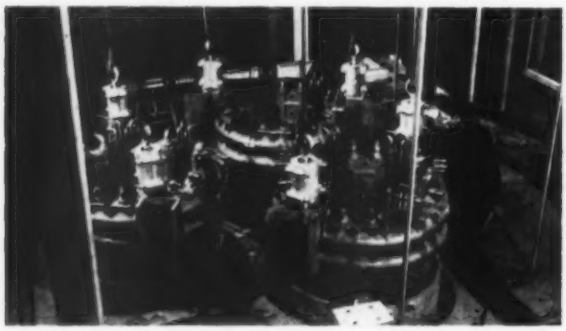
## Silicon Smelting Furnace Requires Piping Maze to Keep Cool

**Construction is almost finished** on a new 6000 kva electric furnace being built by the Dow Corning Corporation, at Midland, Mich. Designed to react silica ore with charcoal under a 3100 F electric arc to produce about 250 tons of commercially pure silicon per month, the furnace will be an important source of supply for one of the raw materials used to manufacture silicones.



Only relatively pure silicon is required for use as an alloy in iron and steel. The more recent use of silicon as an alloy for aluminum and in making silicones require a grade that is 95 percent pure. The production of this very pure silica on a commercial scale is therefore a relatively new development.

The furnace consists of a steel shell about 20 ft in diameter and 8 ft high, lined with several feet of refractory. Three electrodes are supported from above by a hydraulic mechanism which will raise or lower them according to the electrical requirements.

The carbon electrodes are 30 in. in diameter and 28 ft long. Each electrode weighs about seven tons. A maze of small diameter water piping surrounds the top of the furnace, to carry cooling water to the carbon electrode clamps.

In the furnace, the coke and charcoal remove the oxygen from the silica. Carbon monoxide is given off and burns at the surface of the charge to form carbon dioxide. The puddle of molten silicon at bottom of charge is tapped out periodically and molded into billets that are cooled and used in the production of silicones.

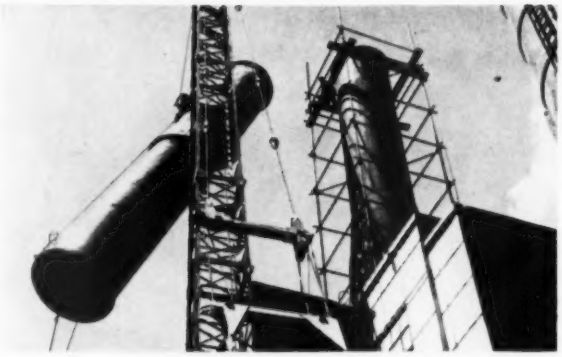
## Glass Lining for Smoke Stacks Makes Bow at Milwaukee Plant

**A new ceramic-steel union,** glass fused to steel, was pioneered recently when the A. O. Smith Corp. fabricated and erected the first glass-lined smoke stack in industry.

A 3-ton section, 44 ft long and 6 ft in diameter was raised by a 120-ft boom crane to become the top section of an 85-ft power house stack at the company's plant in Milwaukee.

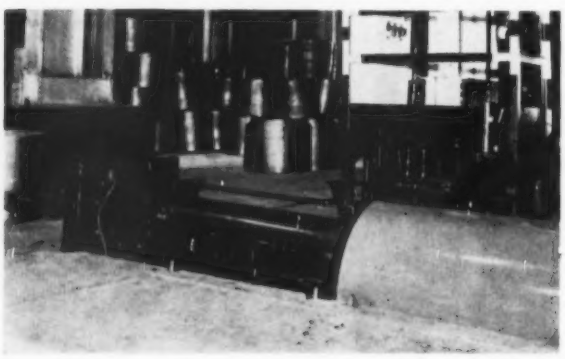
The stack sections were coated inside and out with two glass linings, each approximately 0.005 in. thick. The bonding of the linings was accomplished at 1600 F.

Special acid-resisting glass was fused to the steel stack to combat the normal corrosion of metal caused by acid condensate in the smoke—a factor that accounts for the shortened lives of industrial stacks made of steel.



## Air and Hydraulic Cylinders Do the Handling at Sheet Mill

**A 72-in. stroke** mill type air cylinder, with a pusher head is the first of seven special Lindberg Engineering Co. air and hydraulic cylinders that push, tilt, lift and pull heavy coils of sheet steel at the U. S. Steel Sheet & Tin Mill in Gary, Indiana. The coils are finally positioned on three gravity conveyors leading to the entry end of the pickling lines.



Cranes lift the coils from the storage area in the raw coil pickling department and position them upright on a powered conveyor leading to a turntable. Here, an operator turns the table until the coil is positioned snugly against the pusher head of the first air cylinder, shown in the photograph.

This cylinder pushes the coil onto a powered conveyor that carries it to a point where a hydraulic cylinder with an 84-in. stroke operates in conjunction with a tilting device to tilt the coil on its side. The coil, then set on a dolly at the end of this conveyor, is lifted by a pendulum mounting mill type hydraulic cylinder. The dolly is pulled down to one of three gravity conveyors feeding the entry end of the pickling lines, by a 288-in. stroke hydraulic cylinder.

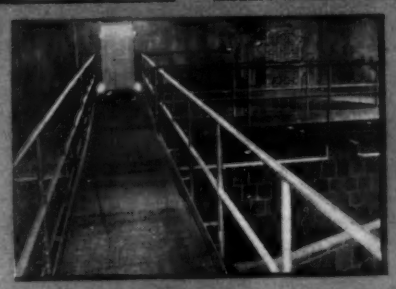
Each of these conveyors has a 96-in. stroke cylinder mounted at its entry, to push coils to the pickling line.

# Parlon Stays On!

## Long-term protection against chlorine and moisture . . .

Mr. R. E. Ferguson, Master Mechanic at Southland Paper Mills, Lufkin, Texas, inspects wet end of Fourdrinier machine—protected with one coat of Parlon for twelve months. Plates in center have been wiped free of pulp to show excellent condition. This Parlon paint is Napko Durachlor, Southland Green #5110—applied over one coat Napko Red Oxide Metal Primer #1327, both made by Napko Paint & Varnish Co., Inc.

(Right) Metal railings and catwalks at D. M. Bare Paper Co., Roaring Springs, Pa., finished with two coats of Parlon paint applied in 1950. Paint is still in excellent condition despite condensation from live steam from pulp in area below. This Parlon paint is known as Tornesit, made by Perry-Austen Mfg. Co., Staten Island, N. Y.



(Above) At Scott Paper Company, Everett, Washington, four coats of a Parlon paint gives average service life of eight years on wooden bleach cell tubes in first-stage chlorinator. Parlon paint used is known as Peron, made by Petro Paint Company—a subsidiary of Rudd Paint & Varnish Co., Seattle, Washington.

In paper mills, where moisture and chemicals are constant enemies of processing equipment, paints made from Hercules Parlon (chlorinated rubber) are doing a remarkable job of cutting maintenance costs. Often they obviate installation of costly corrosion-resistant materials. Even chlorine finds its match in Parlon.

Parlon is easy to apply and serves equally well on metal, concrete, wood, and special surfacings. It dries almost as fast as lacquer, and is highly resistant to wear and abrasion as well as to acids and alkalies.

If corrosion is a particular problem with you, specify "paints made with Parlon." In paper and textile mills, chemical plants, refineries, sewage disposal plants, and water works, ships, and railroads . . . Parlon gives better service at lower long-term costs. See your regular supplier for details on Parlon-based paints or write Hercules.

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## Expansion of Generator Production Facilities Features Assembly and Test Pits

**An expansion program** now being completed at the Transportation and Generator Div., Westinghouse Electric Co., East Pittsburgh, Pa., has nearly doubled the company's capacity for production of generators and large motors.

Heart of the expansion is a new 100,000-sq-ft building that parallels the previous manufacturing aisle. Turbine generators up to about 60,000 kilowatts will continue to be built and tested in the former manufacturing areas, where two machining aisles have been rearranged. Larger machines, and waterwheel generators, will be machined in the former areas, but will be assembled and tested in the new building.

An outstanding feature of the new building is its use of assembly pits for turbine generators. Actually large jigs, the pits will be used for the complete assembly operation. The finished generators will be lifted from these assembly pits into test pits. Testing will be the sole function of these pits; no assembly will be done there.

The test floor apparatus includes a three-phase reactor, housed in a concrete block structure, to be used in running full-load tests on large generators. This new equipment will make it possible to load test more generating equipment and larger units than have ever before been so tested in this country. A new substation supplies the test floor.

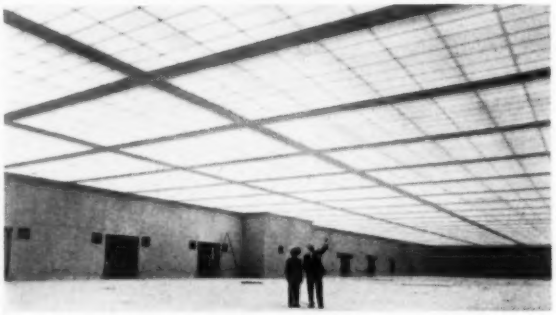
A new portable enclosure to be used for balancing and seasoning large rotors will permit all operations to be conducted within a totally enclosed, sound-absorbing structure. The enclosure (shown in the photograph) can be used in any of the three test pits.

A water recirculating system will provide the large quantities of water required for the operation of the test floor. The system utilizes city water for make-up only, and can handle 6,000 gallons a minute.

## Illuminated Ceilings Light 1½ Acres in New Research Buildings

**Providing upwards** of a hundred footcandles in more than 65,000 sq ft of floor space, the light installation in the Styling Building of the new Ford Research and Engineering Center, Dearborn, Michigan, is one of the largest such installations in the world today.

The over-all lighting system integrates ceiling and lighting with the architectural and interior design of the building. Designed by Smithcraft Lighting Division, the system is important architecturally as well as decorative. The ceiling conceals a network of pipes, ducts and beams, yet presents a neat appearance and at the same time provides high levels of illumination in these very large work areas.



## Safety Supply Store in Paper Mill

**Plant employees** at the Tyrone, Pa., mill of the West Virginia Pulp & Paper Co. are constantly reminded to make their job a safe one. Safety posters are displayed; safety leaders point out safety hazards; frequent safety meetings are held. Also on display are such items as helmets, goggles, first aid kits and similar items, many of which were supplied by Mine Safety Appliance Co. Frequently-changed displays heighten employee interest.

## Conveyor Belt Cleats Stop Slippage

**To solve the problem** of slippage of 50-lb paper bags of mineral wool insulation, Baldwin-Hill Co., Trenton, N. J., came up with a solution involving belting "cleats."

The surface of the belt permitted the bags to slide and jam up the conveyor. Recently, Ruff-Top conveyor belting, made by Thermoid Co., Trenton, was cut into cleats which were bolted to the surface of the conveyor belt. The rough surface of the cleats prevents bag slippage.

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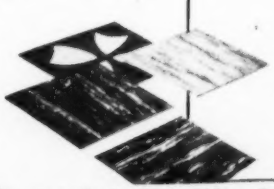

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*If you don't know the name of your Kentile Flooring Contractor look under FLOORS in your Classified Phone Directory or write Contract Dept., Kentile, Inc., 58 2nd Ave., Brooklyn 15, N. Y.

**For more facts circle 569 on Reply Card**

## Radio Communication Helps Check Temperatures in Huge Alloys Plant

**Industry has found** another application for the walkie-talkie—this time at the new plant of the Electro Metallurgical Co., a division of Union Carbide and Carbon Corp., near Marietta, Ohio. As the world's largest alloys plant, distances are great, and communications are a vital factor.

The most significant operation at the Marietta plant is the production of a new chromium alloy for making stainless steel. Called Simplex ferrochrome, it is made in walnut-sized pellets, by pelletizing finely ground high carbon ferrochrome. The pellets are sent through a drying oven, and finally baked in a special furnace, to remove as much carbon as possible.

The building in which this alloy is made covers an area of 7½ acres, all under one roof.

The control of temperatures in the furnaces is of utmost importance, and communications between the furnace area and the control room must be rapid. A two-man team, armed with an optical pyrometer and the radio, checks furnace temperatures and relays them immediately to the control room.

## Accurate Preforms Cut Molding Waste in Manufacture of Plastic Ware

**Maintaining the weight** of "preforms" accurately when molding objects of thermo-setting plastics is a critical factor in production because all "flash" remaining after the final pressing operation is a total loss. The ability to keep this weight uniform is one reason International Molded Plastics Inc., Cleveland, Ohio, has been using preform presses on this process since 1946.

International uses three presses to manufacture proprietary dinnerware and custom articles such as radio cabinets and electrical parts. Each press occupies a separate room with its hopper feed supply directly overhead in a separate room to prevent color contamination. One press operates on phenolic mixtures and the other two on melamine compounds.

Production requirements are such that many thousands of melamine formaldehyde preforms must be compacted daily. By nature, this material requires from eight to 10 tons pressure per square inch to produce preforms of satisfactory hardness for handling in the shop. The presses now in use not only meet these specifications, they also provide greatest area per die dimension. This makes it possible to produce rectangular and other shaped trays. Another important advantage is the ease with which the presses can be cleaned, since absolute cleanliness is imperative. Presses are manufactured by Baldwin-Lima-Hamilton Corp.

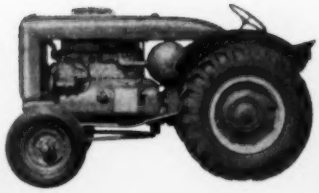
## Noise Reduction Unit Keeps Blowers Quiet, Neighbors Happy

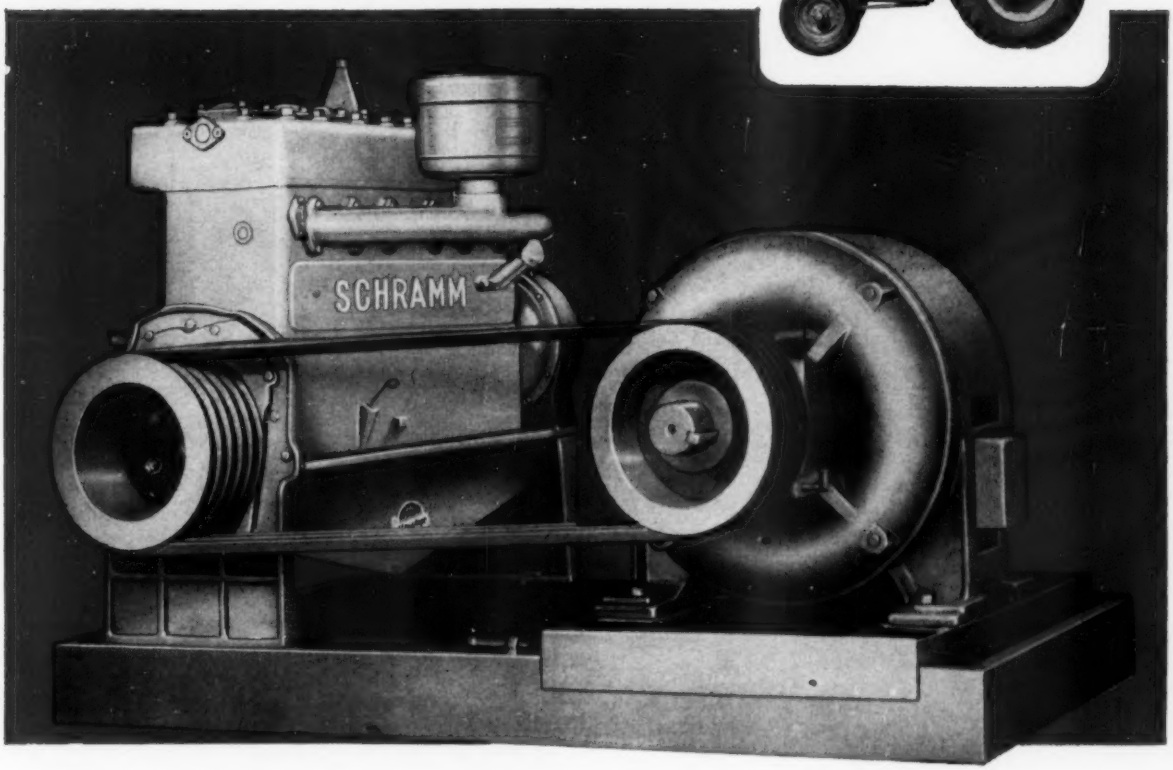
**One of the largest** noise reduction units ever constructed in this country is incorporated in Lever House, the 24-story glass and stainless steel headquarters of Lever Brothers Company on Park Avenue, New York City.

The silencing unit, installed in an intake 70 ft long and 15 ft high, quiets noise from seven blowers in the air intake unit of the air conditioning system in the building. The only comparable silencing system, in cross sectional area, has been constructed in connection with jet engine test cells in the aircraft industry. The Lever House installation has 1,000 sq ft cross section, while jet engine test cells are about 900 sq ft, although the latter handle a larger amount of air than the unit at Lever House.

The silencing unit, installed by the Industrial Acoustics Company, New York City, is located behind the large second story louver, in the plenum chamber between the louver and the blowers. The unit handles an air intake of 200,000 cfm.

# Teamed for Top Performance!






## ...SCHRAMM Air Compressors and *Gilmer* V-Belts

Wherever air compressors are used, the name Schramm is known and respected. Often called upon to operate for long periods under adverse conditions, Schramm compressors are built to take it—right down to the GILMER V-BELTS that drive the stationary models and operate the cooling fans of both stationary and portable models.

Like so many other leading manufacturers, Schramm Inc. has for years relied upon GILMER V-BELTS as standard factory equipment on its products.

What more convincing endorsement could any V-belt buyer ask than the fact that such manufacturers, with proud reputations to uphold, team up with GILMER V-BELTS to assure top performance of their own products!

You'll do well to follow their example. Let your local NYB&P-GILMER Distributor supply all your V-belt requirements—from the heaviest multiple V-belt drive to the lightest fractional horsepower drive. Make sure you get *top performance* on every drive!

Gilmer **V-BELTS AND "TIMING" BELTS**

NEW YORK BELTING & PACKING CO. Founded 1846

**NYB&P INDUSTRIAL RUBBER PRODUCTS**

**NYB&P**

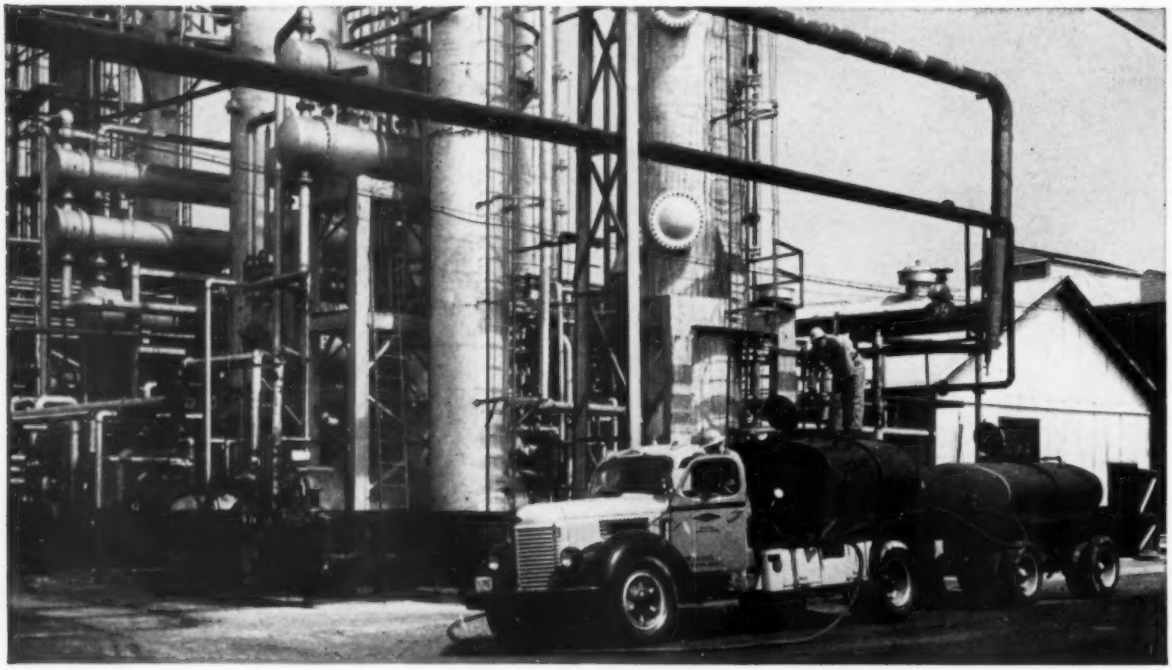
**NEW YORK BELTING & PACKING CO.** 1 Market St., Passaic, N. J.

**America's Oldest Manufacturer of Industrial Rubber Products**

**For more facts circle 570 on Reply Card**

# HEAT EXCHANGER EFFICIENCY RESTORED BY DOWELL SERVICE

## Scale deposits removed by chemistry without dismantling equipment . . . without production shut-down



When scale and sludge accumulate on your heat transfer equipment, there's bound to be a reduction in efficiency with an increase in operating costs.

The Dowell method of removing scale and sludge *by chemistry* has been accepted by thousands of plant operators as a fast, safe and economical way to help restore efficiency to equipment.

Dowell was recently called upon to clean three badly fouled heat exchangers in a refinery. Dowell engineers pumped liquid solvents into the areas of the exchangers to be cleaned. Then, after sufficient reaction time, the spent solutions were flushed from the units, along with the sludge accumulations. After cleaning, one unit could carry the load previously carried by all three.

The Dowell method is fast and economical because solvents are pumped into equipment through regular connections without dismantling. Many types of equipment can be cleaned while in operation. No special devices or rig-ups are needed. It's efficient, too, because these solvents reach wherever steam and water flow. Even the most complicated heat transfer surfaces—angles, curves, piping—have been cleaned effectively in this manner.

Furthermore, Dowell furnishes the trained personnel, the truck-mounted tanks, pumps, heaters, mixers and control equipment to do the job.

What's *your* cleaning problem? Dowell engineers will be glad to talk with you about better, faster and more economical ways to clean your equipment. Contact your nearest Dowell office today. Or, write directly to Tulsa, Dept. G-27.

# *DOWELL SERVICE*

*Over 100 Offices to Serve You with Chemical Cleaning for:*

Boilers • Condensers • Heat Exchangers • Cooling Systems
Pipe Lines • Piping Systems • Gas Washers • Process Towers
Process Equipment • Evaporators • Filter Beds • Tanks

*Chemical Services for Oil, Gas and Water Wells*

DOWELL INCORPORATED · TULSA 1, OKLAHOMA

**DOWELL**

*A Service Subsidiary of*
THE DOW CHEMICAL COMPANY

**For more facts circle 571 on Reply Card**

# Check the Extra Values in WAYNE COMPRESSORS

**1. GUARANTEED FULL-RATED OUTPUT**

Full-rated usable air output guaranteed on basis of scientific pre-tests of volumetric efficiency and performance . . . all the air your machines need.

**2. JOB-ENGINEERED FOR YOUR PLANT**

Designed and built to your individual on-the-job requirements . . . checked for efficiency and operating tolerances . . . minimum maintenance and low operating costs.

**3. EXTRA COOLING CAPACITY**

Larger number of thinner, deeper fins on cylinder block keep temperatures low. Large combined flywheel and fan direct air on intercooler and after-cooler.

**4. LONGER SERVICE PISTONS**

Lightweight automotive type pistons eliminate major cause of overheating and high power consumption. Piston lands permit expansion where heat is greatest.

**5. "WEAR-GUARD" LUBRICATION**

Revolutionary constant level oiling system assures adequate lubrication even if oil is low in reservoir . . . guards against over-oiling. Less danger of burning out bearings.

## FOR LONGER, TROUBLE-FREE SERVICE LOWER OPERATING COSTS—POSITIVE AIR

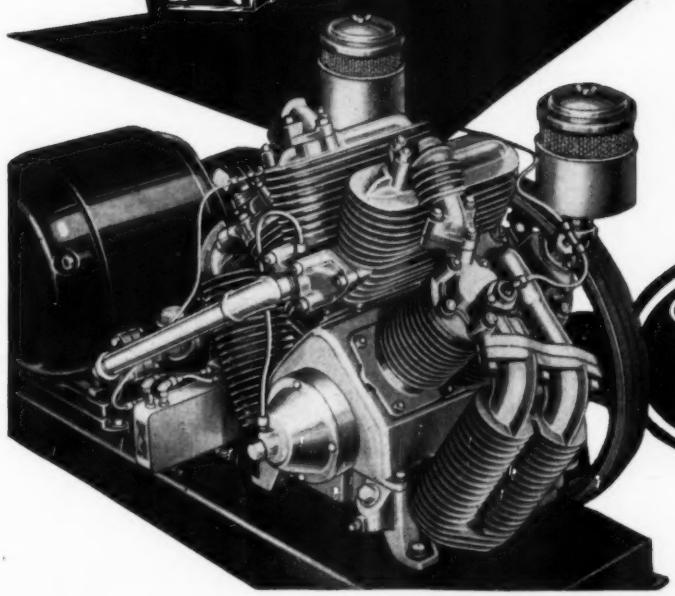
Let the extra values in Wayne Air Compressors go to work for you, for extra production in your plant. From first design to finished assembly, every Wayne Compressor is built to give you extra efficiency . . . more value for your compressor dollar.

Wayne engineering features are aimed at providing a better compressor in every way—cooler in operation, with lower power consumption, higher efficiency, lower maintenance costs, and longer, trouble-free life.

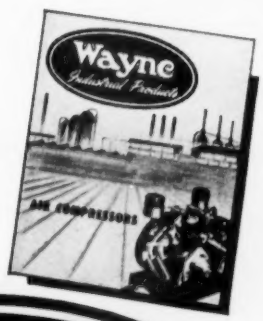
When you buy a Wayne Compressor, you buy guaranteed full-rated usable air output . . . all the air you need for all your machines. And every Wayne Compressor is backed by a nation-wide service organization. Make your next compressor Wayne.

## THE WAYNE PUMP COMPANY

SALISBURY, MARYLAND • TORONTO, CANADA



Send today for new illustrated booklet on Wayne Air Compressors.




Wayne

NATION WIDE SERVICE

For more facts circle 572 on Reply Card

# No more drudgery for me in cleaning grease-caked floors

A flip of the switch re-sharpens brushes automatically!

## His boss is happy too . . .

*and should be. Now an Industrial Dry-Scrubber, Finnell's 84XR at left, does the job in about one-tenth the man-hour time required to hand-scrape the floors!* And of course the machine is far more thorough, and spares maintenance men the back-breaking effort of manual methods. Equipped with two powerful scarifying brushes, the *84XR* digs through and quickly loosens even the most stubborn coatings of dirt, oil, grease, and shavings. Universal couplings enable the brushes to clean recessed areas that rigid coupling brushes would pass over and miss.

Reversible motor keeps wires sharp. *A flip of the switch* reverses the rotation of the brushes and re-sharpens them automatically . . . *while working!* Eliminates the need for frequent changing of brushes by hand in order to maintain a sharp cutting edge. Reversal of brush rotation also helps keep the brushes functioning efficiently by ejecting sticky substances that would otherwise clog and slow up the cleaning process. Total brush spread of the *84XR* is 22 inches. Low, compact design permits cleaning right up to and beneath machinery — areas where deposits are heaviest. Interchangeable rings and brushes adapt the machine to wet-scrubbing, polishing, and steel-wooling.

Clean floors allow industrial trucks to move swiftly, surely and, according to actual tests, with *half the pull* it takes to move loads over dirty floors. In addition, clean floors aid safety underfoot and contribute to worker productivity. So it pays to keep floors clean — especially with a labor-saving *84XR!* (The Vacuum Cleaner at extreme left, *Finnell's 10B* for wet and dry pick-up, features a By-Pass Motor.)

For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 5307 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

**FINNELL SYSTEM, INC.**

*Originators of Power Scrubbing and Polishing Machines*

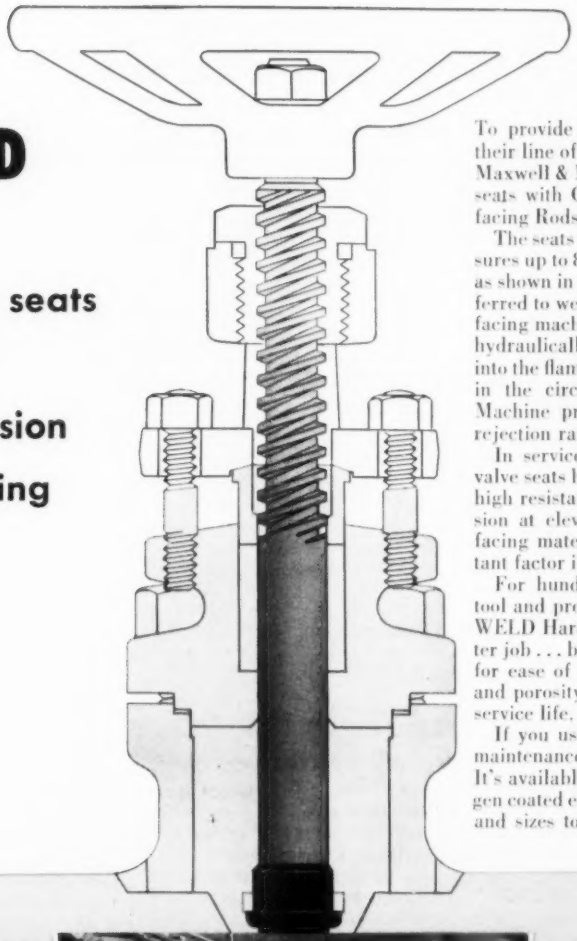
50th Anniversary — Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES

For more facts circle 573 on Reply Card

# REXWELD

## hard-faced Hancock valve seats resist erosion, corrosion, abrasion ...are non-galling



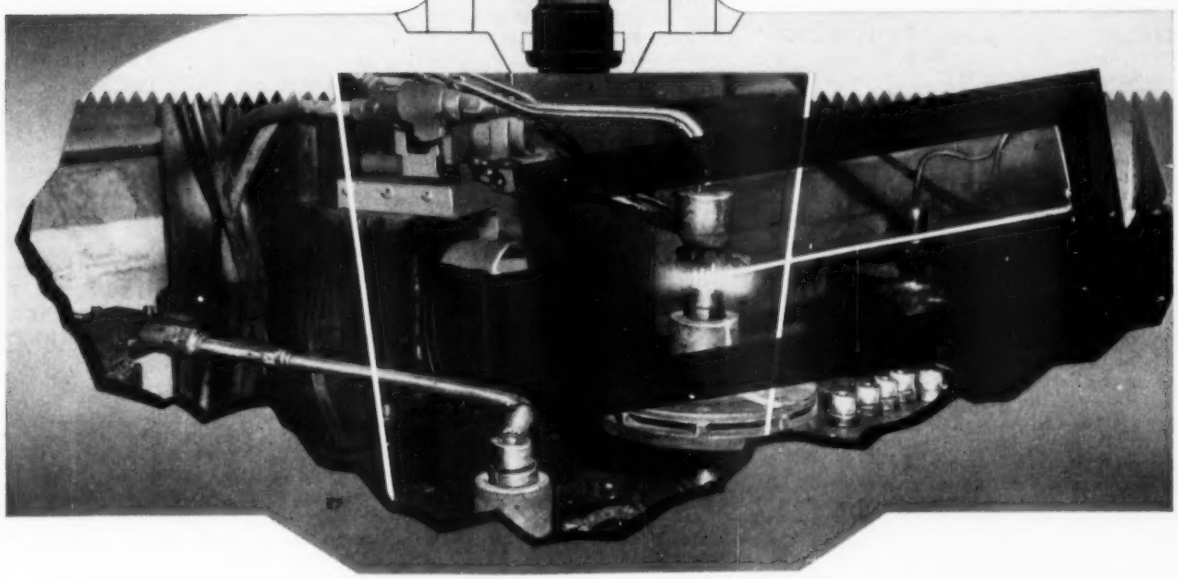
To provide long, trouble-free service life for their line of Hancock gate valves, the Manning Maxwell & Moore Company hardface the valve seats with Crucible REXWELD A Hard Surfacing Rods.

The seats for these valves, which handle pressures up to 800 psi at 750°F, are first preheated as shown in left portion of photo . . . then transferred to welding table of semi-automatic hardfacing machine. After welding head is lowered hydraulically, a rod of REXWELD A is fed into the flame and the molten metal is deposited in the circular recess in the seat surface. Machine produces 70 seats an hour, with a rejection rate of only 1%.

In service these REXWELD hard-surfaced valve seats have demonstrated an exceptionally high resistance to erosion, corrosion and abrasion at elevated temperatures, and the hardfacing material does not gall — a very important factor in good valve operation.

For hundreds of other applications where tool and product life must be increased, REXWELD Hard Surfacing Rods have done a better job . . . because they are especially designed for ease of application and to produce crack and porosity free surfaces that give maximum service life.

If you use hard surfacing in production or maintenance, be sure you order REXWELD. It's available in both bare rods and low hydrogen coated electrodes—in many different grades and sizes to meet your specific requirements.



**CRUCIBLE** first name in special purpose steel

*53 years of Fine steelmaking*

**REXWELD HARD SURFACING ROD**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REZISTAL STAINLESS • REX HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

**For more facts circle 574 on Reply Card**

# NEW PRODUCTS & PROCESSES

summarized for your convenience

*Edited by M. E. Heniken*

**More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards on pages 35-36 and 157-158.**

## 1—ABRASIVE FILE offers continuous feeding feature

The Red Flash is an abrasive file, used like a conventional file, but having a cutting surface that feeds from a coated abrasive roll. The new tool is designed for deburring and other filing and finishing operations throughout the metalworking field. Featuring an 11-in.

stroke, the file holds a roll of more than 6 ft of abrasive cloth, providing a 6-ft cutting surface that is dispensed as needed to provide a fresh surface and maintain cutting efficiency. Other advantages credited to the new tool are faster cutting, increased versatility through a wide choice of abrasive grits, and greater economy, since only the cutting surface need be replaced.

The file, manufactured by Monarch Machine Shop, Inc., comes in a 1-in. and 1½-in. widths, complete with the abrasive manufacturer's Three-M-Ite grit 80 abrasive cloth. Abrasive cloth utility rolls in 50-yd lengths are available for refill purposes in grit sizes from 24 to 320. Minnesota Mining and Manufacturing Co.

## 3—HYDRAULIC PRESS is low cost, versatile shop unit

This hydraulic shop press is equipped with manufacturer's 17½-ton Power-Twin Ram which serves a double purpose since it can be detached from the press and used as a portable power unit. The press comes equipped with a new hydraulic hand pump which develops 10,000 psi, and a 6-ft high pressure hose connects pump and ram. A 15,000 psi gage is supplied to provide actual pounds or tons of pressure used. Bulletin HY-1953 describes this press. Owatonna Tool Co.

## 4—STEEL CASTERS feature double ball-bearing swivels

These new 5- and 6-in. casters have double ball-bearing swivel action for easier handling of movable equipment. Manufacturer says they're priced lower than many casters having only single ball-bearing races. The casters have case-hardened raceways for extra durability and longer service life. Both sizes are offered with company's Baco soft rubber tread, and Atlasite solid composition molded wheels with 1½-in. tread widths. These casters are for loads up to 1400 lb. The Bassick Co.

## 2—TRAINING PROGRAM for safe, efficient truck operation

A new method of training fork lift truck operations is being made available—a program reported equally useful in teaching beginners to become skilled operators in a short time and in refreshing experienced operators. The course consists of lessons grouped together as a full plan of instructions or presented in individual sections. Section I covers the operation of gasoline, diesel and electric trucks. Section II provides information on preventive maintenance and gives practical daily, weekly, monthly and yearly check lists. Section III uses cartoon technique to present safety problems, giving not only the rules but the reasons behind them.

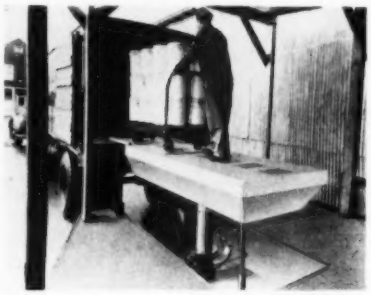
Directions for setting up meetings and conducting training classes are included in the instructor's manual which also provides "tell them" and "show them" hints for each lesson. Also illustrated and explained are tips on loading, estimating cargo weight, lifting and maneuvering. The material also includes layouts

for practice operating courses and a safe driving test to permit the instructor to grade students on an impartial basis. The Yale & Towne Mfg. Co.

## 5—AUTOMATIC DOCK UNIT for easier truck loading

The Load-O-Matic is designed for handling loads between truck floor and loading dock. It is started from the loading dock when the front wheels of the materials handling truck touch a switch bar in the floor of the loading platform, actuating the hydraulic lifting mechanism. A leveling ramp automatically stops the Load-O-Matic when the platform is in the same level plane as the truck floor.

The materials handling truck is then run onto the motor truck floor and unloaded. The trip back to the dock is



automatically started when the truck touches the switch bar from the opposite directions. The Load-O-Matic stops as the platform reaches the level of the loading dock.

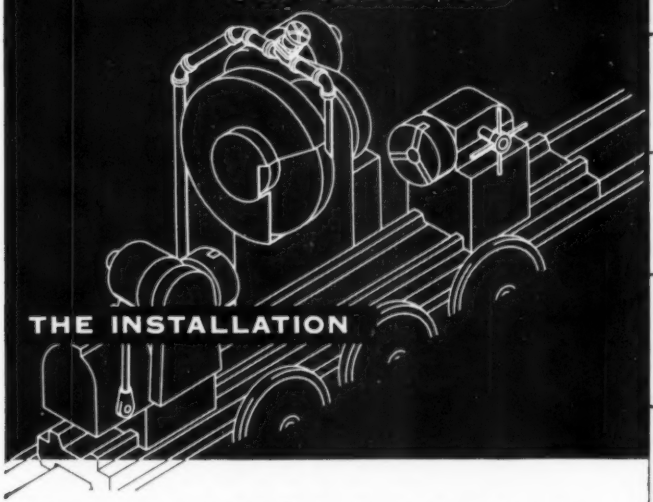
Main advantage announced for the Load-O-Matic is that it operates without hand switches, and the leveling ramp is designed to remove the danger of spilling because there are no grades or faulty levels to cause loads to be bumped off. The standard Load-O-Matic offers a traverse of any 30 continuous inches between a point 30 in. above and below the loading dock. Field Engineering Co.

## 6—PRECISION TOOL for starting nuts and screws

The Universal Nut and Screw Starter is offered to aid in starting small nuts and screws in difficult, hard-to-reach places. It has a lever-mechanism in the handle which controls the movable blades and adjusts the, for gripping standard size small nuts and screws. The pair of movable blades project from a sleeve attached to the handle. As these blades are pushed into the sleeve, the mechanism inside the handle causes them to rotate inward, forming a V-shaped end which grips the screw head and holds it until the screw is started.

Manufacturer points out that since this is a precision tool it should be used only for starting or removing the nuts or screws, and should not be used to set them or break them loose. It will, however, tighten screws to nor-

# How this Valve Solved a Costly Problem ... on Abrasive Fluid, for instance




At Standard Crankshaft & Hydraulic Co., Inc., Charlotte, N. C., with Crane diaphragm valves on regrinding machines, controlling flow of grinding solution to the work.

**VALVE SERVICE RATINGS**

| | |
|---|---|
| **SUITABILITY:** | Far better than expected |
| **FEATURES:** | Pliable Neoprene disc insert |
| **MAINTENANCE COST:** | Zero |
| **SERVICE LIFE:** | Now 8 times longer than other valves |
| **OPERATING RESULTS:** | Forced machine down time stopped |
| **AVAILABILITY:** | Crane catalog item – No. 1610 |

## THE CASE HISTORY

About 3 weeks was the maximum service life of the conventional globe valves formerly on these machines. Their disc and seat were quickly cut out by the abrasive and steel dust that mixed with the re-circulated lubricant. Keeping up with replacements was costly in valves as well as extended machine down time.

Crane 1610 Diaphragm Valves were selected to help if not remedy the situation. They would last longer. Their pliable Neoprene disc insert would absorb the foreign particles that cause leakage and wire-drawing in ordinary valves. And when needed, a disc could be renewed in a few minutes.

But results were far better than expected. The Crane valves installed more than 6 months ago are still in service with no repairs; show no sign of trouble. Naturally, these valves have been put on all grinders.

## THE VALVE

Neoprene disc insert seating is but one feature of Crane Packless Diaphragm Valves. Their sealed bonnet isolates working parts from line fluid. Independent disc and diaphragm design reduces diaphragm wear; permits closure on fluid even should diaphragm fail. These valves come in many body and trim materials for corrosive, abrasive, or common services. See your Crane Catalog or Crane Representative.

*THE BETTER QUALITY... BIGGER VALUE LINE... IN BRASS, STEEL, IRON*

# CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
*Branches and Wholesalers Serving All Industrial Areas*

***VALVES • FITTINGS • PIPE • PLUMBING • HEATING***

**For more facts circle 575 on Reply Card**

# NEW PRODUCTS

(Begins on page 126)

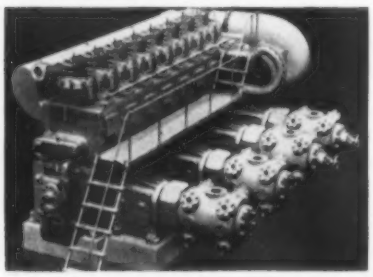
mal "instrument tightness." The tool has a lightweight aluminum body and handle, steel blades. Its six sizes are designed to accommodate standard-size nuts from a No. 6 to a ¼ in. nut, and from a No. 4 to No. 10 screw. Aviation Service Supply Co.

## 7—LIFTING UNIT for the overhead maintenance jobs

By taking the maintenance man up to the job, the Lift-A-Loft eliminates many overhead maintenance problems. Manufacturer points out that its use reduces to one man the several-man crew often required to make such work safe. This versatile unit lets the maintenance man reach ceiling objectives quickly with a minimum of disturbance to production workers. He simply rides the battery-powered Lift-A-Loft to destination, pushes a button, and is up in the air ready to work. The platform is equipped to carry tools and supplies, including enough cleaning solution and clean water for a day's work. When fully raised, the platform of the Lift-A-Loft is 12 ft 8 in. above the floor. Barrett-Cravens Co.

## 8—COMPRESSOR UNIT, turbocharged, gas-engine driven

The Model TRA is a turbocharged, two-cycle right angle gas-engine-driven compressor unit claimed to set new standards for fuel economy and for station auxiliary requirements. The new unit, which develops 1320 bhp, has eight vertical, in-line cylinders of 14-in. bore and 14-in. stroke, integrally connected to horizontal compressor cylinders. In the unitized integral design



incorporated, turbocharger and compressor are built to operate as a balanced unit. The turbocharger is designed to match specifically the characteristics of its companion gas-engine driven compressor. It operates at conservative speeds and temperatures.

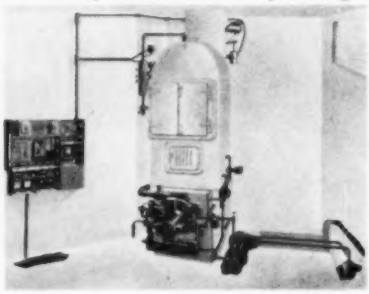
Outstanding features announced for the Model TRA include 50 per cent more power than non-turbocharged units of comparable bore and stroke; new lows in fuel consumption; less water cooling load; flat fuel consumption curve; quieter operation, and compactness with accessibility. Details are given in Bulletin 130. Clark Bros. Co.

## 9—FUEL BURNING SYSTEM is a factory-coordinated package

Now available is a completely factory-coordinated industrial fuel burning system for the conversion of large boilers to gas or oil firing. Built around manufacturer's York-Power burner, the unit includes proper controls mounted in panels and wired to terminal strips for easy connection, windbox assembly and refractory ring, fuel oil heater assemblies and trim assembly of valves and gages for suction and discharge piping at burner.

An installation of the new F/C System is pictured to show simplification of wiring and piping. Advantages claimed include availability from one source of all components required, and worthwhile savings on both installation and operating costs.

Burners provided in the packaged units are rotary burners, oil- or oil/gas-fired in sizes from 18 to 400 hp. The windbox assembly is a prefabricated unit of heavy boiler plate sized to provide proper amount of secondary air for efficient fuel burning and with all burner mounting holes cut. The factory-wired control panels include five types: main control panel for primary burner and flame control, induced draft fan panel, master relay panel for multi-burner installations, sequence draft control, thermometer and draft indicator panel. York-Shipley, Inc.



## 10—CORK-TOPPED BELT for use on inclined conveyors

Intended for conveying light materials up steep inclines, this belt features a cork filled Neoprene coating. It is said to be impervious to oil, and its rough surface is covered with small pieces of cork which act to grip the material being conveyed and prevent back sliding on inclines. The belt is obtainable in widths to 132 in. Main Belting Co.

## 11—HYDRAULIC CRANE is for indoor or outdoor use

Designed to combine the best features of crawler, truck and erection cranes with those of industrial shop cranes, this new machine is self propelled and hydraulically operated. Four functions are involved: turntable rotation, boom elevation, raising and lowering of cable and hook, and power extension and retraction of the boom.

Although new to industry, this crane is an adaptation of a machine originally designed for the U. S. Navy. Surveys made by manufacturer to determine features most wanted in a crane of this type are reported to result in the following: 360-deg boom rotation; 24-ft horizontal reach from center of rotation; 24-ft vertical lift from ground to

hook; ability to negotiate grades up to 20 per cent under full load, and 15 mph speed under full load. The crane's height is 9 ft, width, 8 ft. Form AD-2206 gives details. Austin-Western Co.

## 12—AIR-PRESSURE REGULATOR is pilot-controlled

Designed for extreme precision in air control over a wide operating range—from 2 to 120 psi with a capacity to deliver more than 200 cfm—this new air pressure regulator is also said to provide more flexibility in machine design and plant layout as well as a more convenient set-up for plant personnel. The pressure regulator can be placed where most effective and the separate pilot control regulator installed where most convenient.

This regulator utilizes regulated air pressure to control delivered air pressure, minimizing the effect of fluctuating line pressure as a factor in delivering uniform working air pressure. A light adjusting spring is provided in the pilot control regulator. Three sizes are available: ½, ¾ and 1 in. C. A. Norgren Co.

## 13—COATING MATERIAL is made of silicone rubber

SE-100 is announced as a versatile new silicone rubber coating material with remarkable electrical and physical strength as well as heat and abrasion resistance; it was developed to replace silicone resins in many insulating applications. Produced for coating many Class H insulating materials or for dipping electrical components, the rubber can also be used for Class A and B insulation, it is noted.

This product is said to be an exceptional coating for glass cloth, glass mat, organic fabrics, mica mat etc., an encapsulating material for coils and cores, and an impregnant for glass-served wire, a capacitor dielectric.

According to company, SE-100 has a higher dielectric strength than other known silicone rubber coating materials, shows little or no change in electrical properties at 315 C. Physical properties are declared unusually stable from -60 to 315 C, it is revealed, abra-

# PIPING RUNS INSTALLED

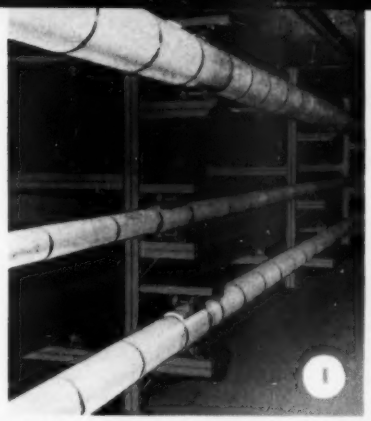
*Better, Faster, for Less...*

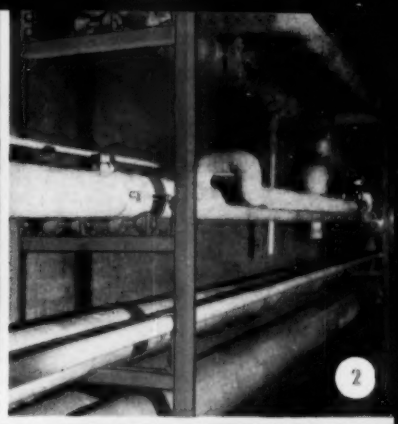
**with adjustable**

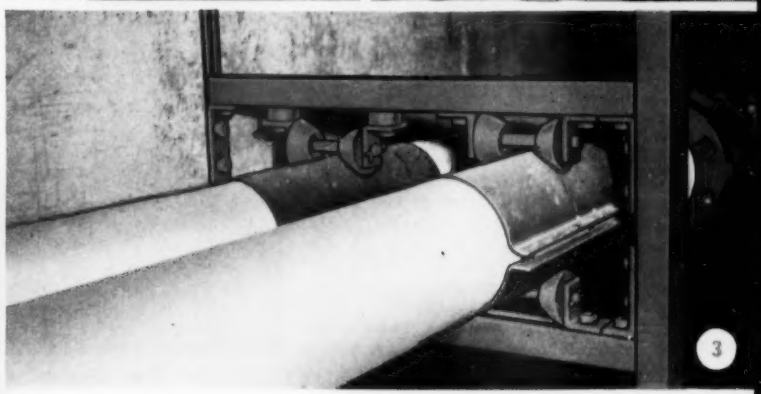
# UNISTRUT®

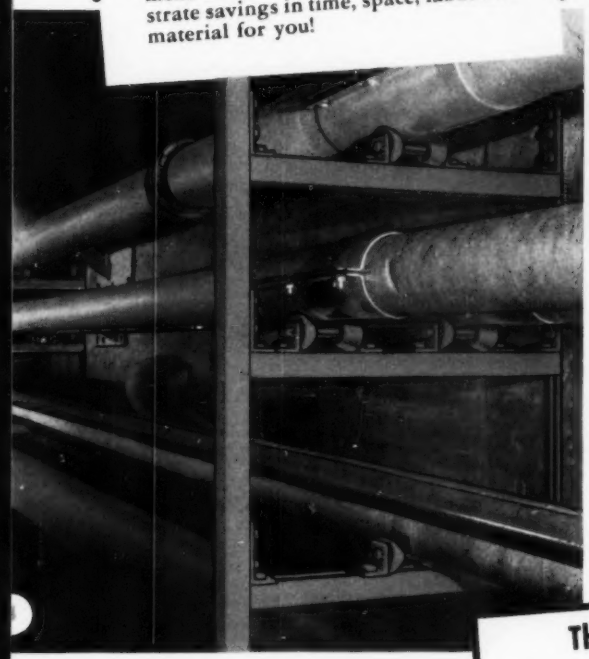
## METAL FRAMING

All-purpose construction material assures exact slope or pitch, permits changes or additions at any time. Easy to erect—no special tools or equipment needed. Let UNISTRUT demonstrate savings in time, space, labor and material for you!



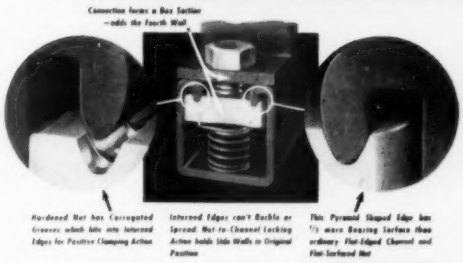
1 Note how UNISTRUT framework's great strength easily supports long runs of heavy piping, including bulky 16" chilled water lines.

2 Typical piping installation supported by UNISTRUT framing, concrete inserts and roller pipe supports. Slotted channel permits attachment of fittings at any desired point.

3 Steamline showing method of supporting pipe at expansion joints. Note pipes are supported above and below with UNISTRUT pipe rollers.

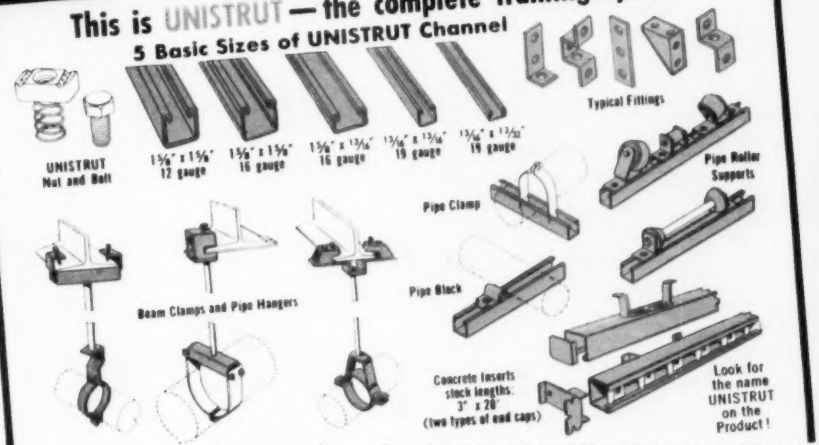
4 Tunnel job showing how UNISTRUT continuous run concrete inserts can be installed vertically or horizontally, or at any angle required.

**Only the UNISTRUT Framing System has this Positive Clamping Action at all Points of Connection!**


Connection forms a Box Section —adds the Fourth Wall
Hardened Nut has Corrugated Grooves which bite into Interned Edges for Positive Clamping Action
Interned Edges can't Buckle or Spread Nut to Channel Locking Action holds Side Walls in Original Position
This Pyramid Shaped Edge has ½ more Bearing Surface than ordinary Flat-Edged Channel and Flat-Surfaced Nut

## This is UNISTRUT—the complete framing system

**5 Basic Sizes of UNISTRUT Channel**


UNISTRUT Nut and Bolt
1⅝" x 1⅝" 12 gauge
1⅝" x 1⅝" 16 gauge
1⅝" x 1⅜" 16 gauge
1¾" x 1¾" 19 gauge
1¾" x 1⅜" 19 gauge
Typical Fittings
Pipe Roller Supports
Pipe Clamp
Pipe Block
Beam Clamps and Pipe Hangers
Concrete Inserts stock lengths: 3" x 28' (two types of end caps)
Look for the name UNISTRUT on the Product!

*Typical stock channel, parts and fittings.*

**Distributors and Warehouse Stocks in Principal Cities. Consult your Telephone Directories.**

**See our Catalog in Sweet's 1953 Plant Engineering, Industrial Construction and Architectural Files.**

U. S. Patent Numbers

| | | |
|---|---|---|
| 2327587 | 2329815 | 2345650 |
| 2363382 | 2380379 | 2405631 |
| 2541908 | Other Patents Pending | |

**Write for NEW *Free* 84-page Pocket Catalog No. 800!**

For the Man on the Job—packed with photos, drawings, ideas and data on how to frame, mount, rack and support electrical and mechanical equipment with UNISTRUT metal framing.

**UNISTRUT PRODUCTS COMPANY**
**1013 W. Washington Blvd., Chicago 7, Ill.**
**Dept. G7**

Please send me a copy of the new Catalog 800, without obligation.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

***The World's Most Flexible All-Purpose Metal Framing***

# NEW PRODUCTS

(Begins on page 126)

sion resistance of coated stock is excellent and tensile strength is 150 lb per inch of width. SE-100 is a white, putty-like compound supplied as a 100 per cent solids material or as 35 per cent solids dispersion in xylene. Chemical Div., General Electric Co.

## 14—PIPE WRENCH of lightweight aluminum alloy

Forged of an aluminum alloy, this spark-resistant wrench has removable beryllium-copper jaw inserts—when the teeth become worn the insert can be removed and another reordered from stock. The wrench is said to possess a dense uniform grain structure with excellent physical properties and tensile strength comparable to that of steel tools. Extremely light, its weight range is from 15 oz for a 10-in. size to 8 lb for a 36-in. size. Removable jaw inserts made of steel can also be supplied where the spark-resistant, corrosion-resistant and non-magnetic properties of beryllium-copper are not required. Ampco Metal, Inc.

## 15—TEST UNIT to reduce electrical equipment failures

The Industrial Multi-Amp is a portable high current test unit for checking and calibrating current actuated protective devices. Its use is intended to reduce electrical equipment and power failures and the threat of electrical fires. With this unit checks can be made on circuit breakers, overload relays and similar devices before they are installed, at the time of installation, and periodically while in service.

The Multi-Amp is described as a loading device, accurately adjustable in stepless increments with fingertip control. It is claimed to be highly efficient,

drawing a neglible amount of power from the line in addition to that required to actuate the device being tested, and to be equally well suited to checking devices with high impedance and low current requirements as those with low impedance and high current requirements.

To make a test you connect the device to the proper output terminals of the Multi-Amp and adjust to the proper value while observing a current indicating instrument and timer. Then you check the results against time-current curves published by the manufacturer of the tested device or against a "typical calibration table." Full details on the Multi-Amp are given in a booklet. The Multi-Amp Corp.

## 16—REGULATOR for large volumes of compressed air

The Type HAA Regulator is designed for handling a large volume of compressed air with a minimum of pressure drop. Its capacity is announced as 80 cfm at 100 lb line pressure, and it comes in two models featuring different inlet and outlet connection arrangements. Company engineers say they have achieved more sensitive control and reduced pressure losses by using air pressure against the regulating diaphragm instead of the spring-loaded

diaphragm. It provides power regulations. This feature is said to make adjustment of the control knob easier—air flow increasing as demand increases without affecting the pressure which has been set.

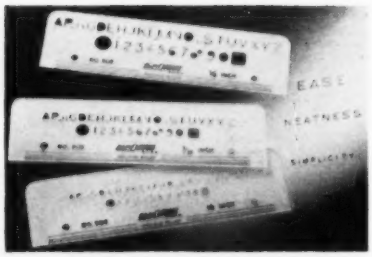
Maximum pressure which can be regulated is 135 psi company says, and maximum line pressure is 300 psi. The unit is about 3½-in. wide, 4½-in. high. The DeVilbiss Co.

## 17—NEW DIFFERENTIAL gives lift trucks more traction

Both purchasers and present users of this company's Model LT-60 Lift Trucks can benefit by the extra traction provided by the No-Spin Differential, designed to give full power to both drive wheels under any operating conditions.

Successful application of this type of unit in highway trucks and similar vehicles recommended its use in the Model LT-60, says manufacturer, since this pneumatic-tired lift truck is used largely for outdoor handling operations where traction difficulties are frequently encountered. In addition to maintaining equal drive-wheel speeds, the No-Spin Differential is said to compensate for differences in wheel speeds when turning in either direction. It is offered at additional cost on the Model LT-60, and is interchangeable with the standard differential. Towmotor Corp.

**One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.**



## 18—LETTERING GUIDES for equi-spaced letters

Designed to facilitate equi-spaced lettering, the No. 900 Lettering Set consists of three plastic guides with letters of ⅛, 3/16 and ¼ in. in modern type. Each template is 6⅞ by 1⅞ in. The set of three templates costs $4.00; individual ones, $1.50. Rapidesign, Inc.

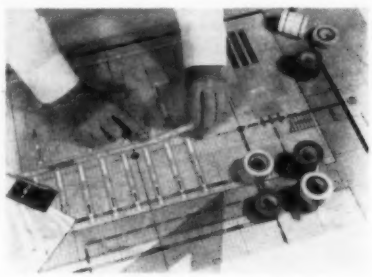
## 19—700-W MERCURY LAMP for medium heights

The A-H18 is a new 700-w lamp offered to fill the size gap between 400- and 1000-w mercury lamps now on the market. Giving 35,000 lumens initially, it is expected to widen the possible uses of mercury lighting by providing a lamp well suited to medium mounting heights. Recommended minimum mounting height for this lamp is 24 ft.

Having an average rated life of 4000-hr, the new lamp may be operated from 460-v circuits with a simple choke and from other voltages with a suitable ballast which also acts as a transformer. The isothermal bulb shape of the A-H18 is said to provide approximately even operating temperatures over the entire bulb wall. It will burn in any position and is designed to start readily at low temperatures. Westinghouse Electric Corp.

## 20—PRINTED TAPES to simplify preparation of layouts

This new method of preparing industrial layouts employs pre-printed components. These include a variety of pressure-sensitive "draftsman-drawn"



tapes representing material conveyors of many types, as well as building column shapes, power and telephone outlets, stairs, windows, aisles. Other tapes include broken and solid lines, reference numbers and letters, and colored arrows. All patterns are available on rolls of transparent self-adhering tapes and many patterns are also available printed on opaque tape.

Now...set fastening studs wherever they're needed
MODEL 450 REMINGTON STUD DRIVER
Here's new economy . . . new speed in construction fastening! The Remington Stud Driver joins wood or steel sections to concrete or steel surfaces in seconds . . . easily sets as high as 5 studs a minute. Powerful 32 caliber charges drive studs arrow-straight. The tool's light weight—only 5½ pounds—simplifies handling wherever studs are needed.
New guards for specific uses now make the self-powered Remington Stud Driver more versatile than ever. These attachments take all the guesswork out of stud location . . . assure fast, accurate fastening for every job. Illustrated are just 4 of these special guards. For full information about the complete line and about the Remington Stud Driver, send the coupon below.
A complete line of guards for special applications
Guard for Structural Channel
Guard for Switch, Utility and Outlet Boxes
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Listed & Approved by Underwriters' Laboratories, Inc.
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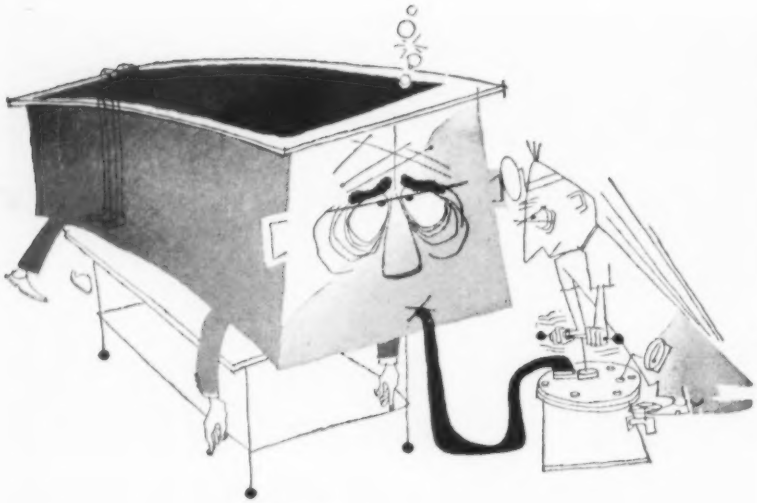


has **coil-itis*** cramped
your production flow?

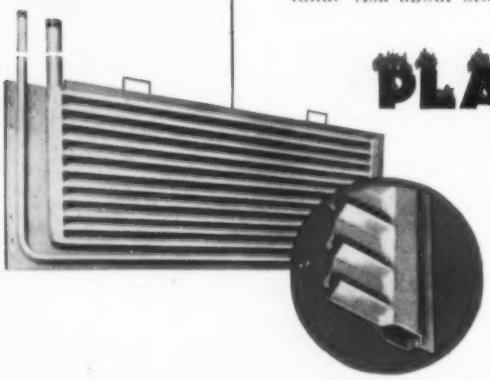
It's a waste of costly time to pump out the solution every time your process heating and cooling tanks get indigestion due to pipe coil troubles. You can save this cost and eliminate production bottlenecks by replacing the pipe coils with Platecoils. Platecoils can be removed and replaced **without dumping the solution.** They simplify maintenance and save hours of downtime. They heat or cool 50% faster and take 50% less space in the tank. As revolutionary as the new wonder drugs, Platecoils cure production troubles involving heat transfer . . . and give profits a shot in the arm.

**Write for bulletin P80 today!**

**PLATECOILS SAVE 50% IN HEAT TRANSFER COSTS**

**PLATECOILS TRIPLE PRODUCTION**

At Continental Motors Corp., 3 crankcase sections can be cleaned at one time when Platecoils are used while only one crank case can be cleaned with pipecoils in the tank. Ask about other case histories.



**PLATECOIL**

**REPLACES PIPE COILS**

*Coil-itis — Diagnosed as tank heating and cooling problems. **Platecoils** — the prescription for solving pipe coil problems.

**Platecoil Division, TRANTER MANUFACTURING, inc., Lansing 4, Michigan**

**For more facts circle 578 on Reply Card**

# NEW PRODUCTS

(Begins on page 126)

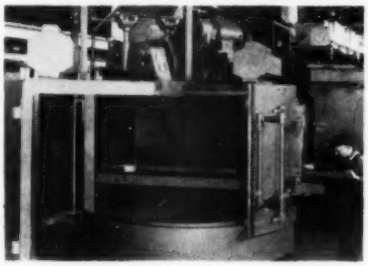
Manufacturer of these tapes also offers plastic planning and layout boards in several convenient sizes, both transparent and opaque. They are printed with non-photographic grid lines, spaced at ¼ in. intervals. Company says that plant layouts made by this method can be readily reproduced by usual methods. Chart-Pak, Inc.

## 21—STEAM TRAP is large side-inlet side-outlet unit

The No. 814 is a steam trap with 1- or 1¼-in. threaded connections. It is offered to meet the demand for a larger size trap with horizontal and opposite pipe connections. Body and cap are cast semi-steel; valve and seat are hardened chrome steel, and interior trim is stainless steel. Capacities of the trap range up to 6800 lb-hr, depending on pressure; pressure range is 0 to 250 psi. The trap is 13⅝ in. dia and weighs 45 lb. Armstrong Machine Works.

## 22—BLAST CLEANING TABLE equipped with access door

Addition of an access door to the LK Rotoblast Cleaning Table makes the machine more flexible. With this accessory it is possible to blast clean long

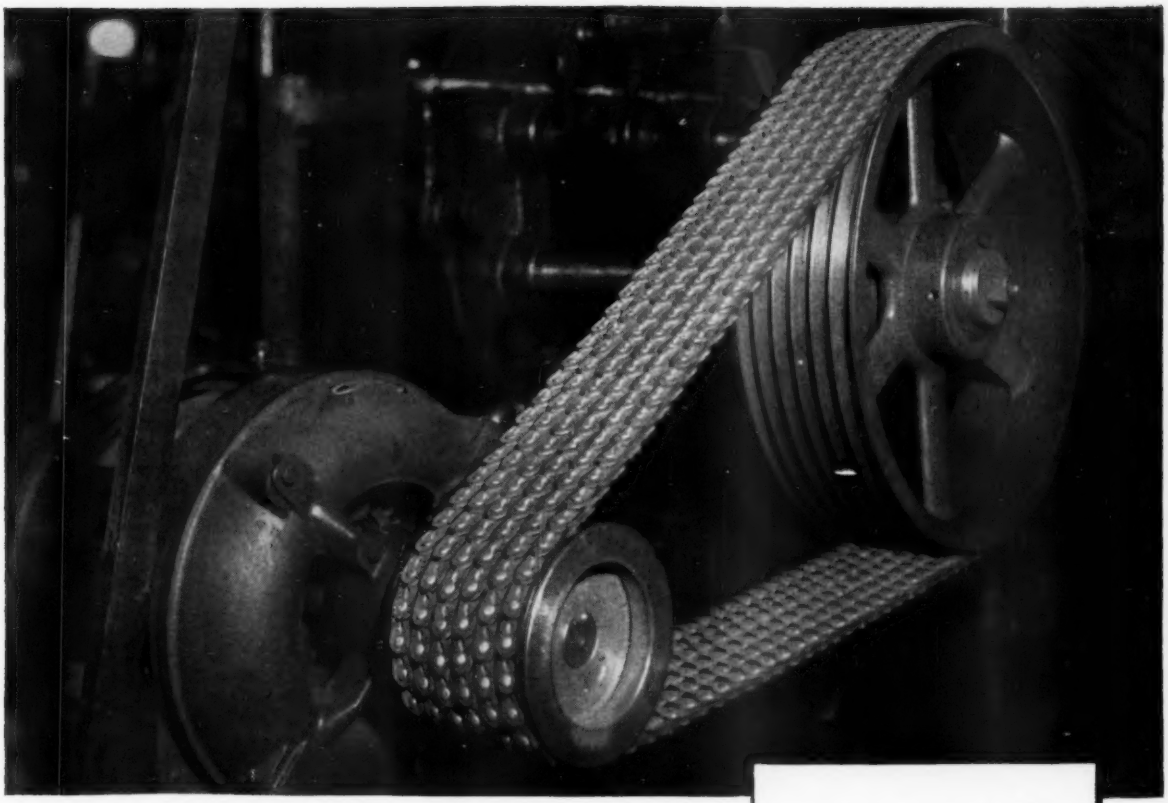


sections in a table of small diameter—a desirable feature when the usual run of work in the cleaning room is of a certain size range, but an occasional larger piece also requires cleaning. There are flexible rubber curtains over the access opening to prevent abrasive grit from flying out. Pangborn Corp.

## 23—CANTILEVER CARRIER for handling around pillars

This new type of overhead carrier has a cantilever arrangement to permit handling of loads beyond the end of the crane on which the carrier operates. It was designed especially to take care of situations requiring the handling of materials in areas between roof-supporting pillars that cannot normally be covered by cranes, and, also for reaching through doorways.

Company says the extension feature of the carrier permits the hoist to reach out as much as 2 ft-1½ in. beyond the end of the crane; and when it is necessary to travel the crane for some distance on its runway, the carrier is moved from the crane end to permit safe clearance of the columns.



## with Veelos on your machines...

## *v-belt adjustment is a production-saving job*

All v-belts stretch—but with endless v-belts there's nothing you can do to take up this stretch once the motor has been completely "run-out". With Veelos it's another story! The adjustment is in the belt itself—even sliding motor bases are unnecessary.

Changing the length of each Veelos v-belt by just adding or removing links is the best, most efficient, way to keep the belts correctly matched. Using Veelos means that the job of adjustment is done easily and quickly . . . at a fraction of the cost of replacing with new belts.

Veelos, the adjustable v-belt, provides vibrationless, full power delivery. It is easier to stock and control because it is packaged on 100-foot reels in every standard width. And Veelos can be adjusted or made up in correctly matched sets with the least amount of machine down-time—at production-saving speed!

### Have you seen this Veelos Facts Book?

Your Veelos v-belt distributor's salesman will be glad to give you a quick trip through this fact-packed, 36 page book. You'll find it well worth the few minutes it takes. Next time the salesman calls, ask him to show it to you.

**VEELOS**
THE LINK
**V-BELT**

Write today for your copy of the Veelos Data Book—it is a completely illustrated, 28-page catalog that gives file-worthy product and engineering facts which you should have handy. We'll be glad to send you a copy at once.

**MANHEIM MANUFACTURING AND BELTING COMPANY**
652 Manbel Street, Manheim, Penna.

***ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE***

**For more facts circle 579 on Reply Card**

# MICRO limit switches make quill loading an automatic job at 96 Mill

Two MICRO heavy-duty limit switches automatically control the carriage travel of automatic hoists in the 96 Mill of the Matthews Mills at Greenwood, S. C.

The upper switch stops the motor when the carriage reaches the position for dumping the quills into the hopper which feeds the conveyor. The lower switch stops the motor when the carriage returns to the floor. Their use makes it unnecessary for the operator to remain at the hoist during the travel operation.

These switches were selected by the plant engineer of the 96 Mill for this operation because of their sturdy construction, their ability to withstand the high humidity and lint-laden mill atmosphere and because of the ready adjustability of the roller arm actuator to the exact position required.

Plant engineers and maintenance men are finding innumerable applications for MICRO switches to increase the productivity of their equipment by making it safer and more automatic. MICRO authorized distributors are located in key cities with complete stocks of MICRO for such plant applications. Consultation and advice on specific applications may be obtained from your nearest MICRO branch office.

**MICRO** A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

MAKERS OF PRECISION SWITCHES

FREEPORT, ILLINOIS

For more facts circle 580 on Reply Card

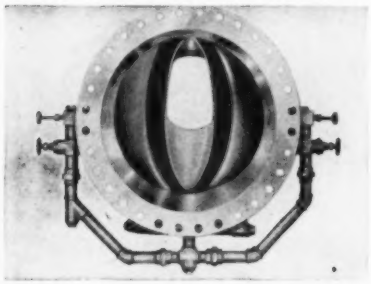
# NEW PRODUCTS

(Begins on page 126)

This unit has a 5000-lb capacity, but carriers of other load capacities and reach can be made. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

## 24—VENTURI TUBE, self-scouring, has elliptical throat

A new concept in venturi tube design, the Type VE is intended to solve the specific problems of accurate measurement of low-velocity, sewage, sludge and trade wastes under low-pressure conditions. The major dimension of the elliptical throat is vertical and equal to the diameter of the circular main



section. This permits a horizontal invert or a flat, straight bottom that is self-scouring. Another feature of the unit is its straight, flat top. This, manufacturer points out, prevents the accumulation of air or gas which could impede liquid flow and enter instrument reading lines.

The circular inlet and outlet simplify connections to existing mains. When teamed with a venturi meter, this elliptical venturi will measure low-velocity, sediment-bearing liquids under a wide range of pressures. Simplex Valve & Meter Co.

## 25—BACK-UP RINGS to prevent extrusion of O-rings

Spirally machined of tetrafluoroethylene (DuPont's Teflon), these back-up rings have a high impact strength at temperatures from -100 F to 500 F. They are said to be non-corrosive, non-adhering, non-fraying, inert to most chemicals and self-lubricating. They are made for O-ring sizes to AN drawings 6227 and 6230. The Garlock Packing Co.

## 26—COMPUTING DEVICE helps solve wiring problems

This little pocket size wiring data and weight computer is announced as the most complete yet available for solving building wire, power cable, flexible cord, fixture and motor wiring problems. Information provided on this computer includes current-carrying capacities for building wire and power cable systems; circular-mil areas for wire sizes from No. 14 through 1,000,000 cm; voltage-drop data; conduit sizes

...use in narrow aisles and congested areas?

...jobs where driver gets on and off frequently?

...fast handling at all times?

...loading road trucks and freight cars!

***If your answer is "YES" to any question, look at these plus features of the***

**MODEL F-38T**
**2000 lbs. Capacity**

# NEW ELWELL-PARKER "Cargo Scout"

***ELECTRIC OPERATION***—means power costs are only pennies per day. No vulnerable clutch and reciprocating parts to wear out. No battle with exhaust fumes. Noiseless operation does not interfere with inter-com systems.

***UNIT ASSEMBLY***—cuts repair time. All parts instantly accessible for lubrication or repairs. Major assemblies are completely independent, permitting swift removal for bench repair.

***END CONTROL***—fast, easy and safe for operators who must get off the truck frequently. Stand-up operation keeps the driver alert, provides better vision.

***CONTACTOR CONTROL***—insures fast, smooth starts and instant response to operator's demands. Just one handle controls speed and direction. Contactor controls are easier to maintain.

***360° STEERING***—plus a short, 57″ turning radius for close-quarters operation. Truck trailer and box car loading is faster. Small size elevators no longer a problem. Special device completely eliminates steering wheel kick-back.

***TELESCOPING UPRIGHTS***—permit use of all available storage area. 100″ of lift with only 68″ overall height with uprights retracted and a full 50″ of free lift.

**GET ALL THE FACTS;** *write The Elwell-Parker Electric Co., 4178 St. Clair Avenue, Cleveland 3, Ohio.*

**ELWELL-PARKER**
**POWER INDUSTRIAL TRUCKS**
*Established 1893*

**"Cargo-Scout"** = famous E-P dependability plus Remarkable Maneuverability

**For more facts circle 581 on Reply Card**

...Then **ALGRIP** Banished Slipping Accidents and Pared the Company's High Insurance Rates!

ELIMINATED: Crippling accidents that slashed production.

SAVED: Lost man-hours and high insurance premiums.

Take a machine tool, surround it with oil-filmed flooring, and you've set the stage for a tragedy. This one—in a southern industrial plant—cost a skilled workman his arm.

Then we installed A.W. ALGRIP Abrasive Rolled Steel Floor Plate. Result: No more slipping accidents! For tough abrasive "grinding-wheel" grain, rolled deeply and densely into steel plate, makes ALGRIP truly non-skid. It's almost impossible to slip on this hard-gripping floor plate—even when it's wet or oily—even on steep inclines!

**Benefit:** *A three-way saving . . . (1) No more costly, crippling accidents. (2) More efficient work and better production. (3) A substantial reduction of workmen's compensation insurance premiums—substantial enough, in fact, to pay for the cost of the ALGRIP installation!*

**End Slipping Accidents that Cripple Men and Production—and Kite Insurance Premiums.**

A.W. ALGRIP—only abrasive rolled steel floor plate in the world—pays for itself in savings from safety. Get the full ALGRIP story today; write for our new Booklet AL-7 —without obligation.

*Over 125 Years of Iron and Steel Making Experience*

**ALGRIP Abrasive Rolled Steel Floor Plate**

**ALAN WOOD STEEL COMPANY**

CONSHOHOCKEN, PA.

*Other Products:* A.W. SUPER-DIAMOND Floor Plate • Plates • Sheet • Strip (Alloy and Special Grades)

**For more facts circle 582 on Reply Card**

# NEW PRODUCTS

(Begins on page 126)

required for two- to six-wire systems; sizes of wire required for motor wiring usages; temperature rating, current-carrying capacities and maximum voltage ratings of flexible cords and fixture wire, data on Underwriters' Laboratories' groupings and classifications. The computer is available without charge to qualified plant engineers; your job title and company name must be given when requesting it. Hatfield Wire & Cable Div., Continental Copper & Steel Industries, Inc.

## 27—STEAM GENERATORS are ready-to-install units

Built for automatic firing with oil, gas, or stoker coal, these new water-tube steam generators are available in nine sizes with capacities from 5300 to 33,000 lb of steam per hour and for pressures to 400 psi. Incorporating the "A" type of construction for quick steaming, the tube layout utilized is designed to protect the steam drum from direct impingement. The large steam drum provides ample steam releasing surface and an internal separator is provided to assure dry steam delivery. Water wall tubes are fed uniformly through the adequate lower drums, of uniform diameter throughout their length.

A multiple fan induced draft system is incorporated for cleaner, quieter operation and to insure purging of the combustion chamber before and after firing. Dual induced draft fans and divided second pass afford flexibility of firing range. Shutting down either fan acts to permit operation at lower firing rates.

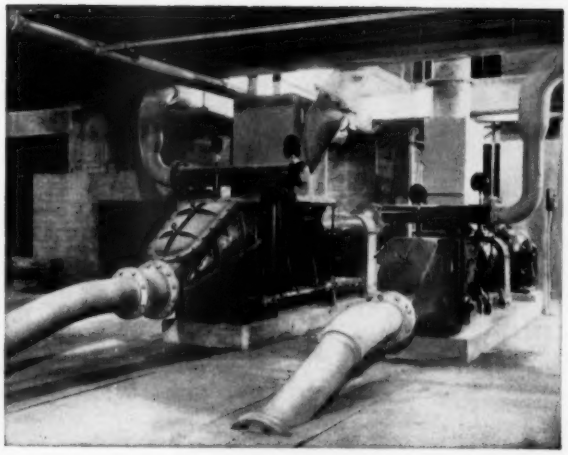
The new generators are shipped ready for operation. Built on a structural steel base, they require no special foundation. Units can be furnished for outdoor installation. Superior Combustion Industries, Inc.

## 28—FORK TRUCK offers fuel economy, easy operation

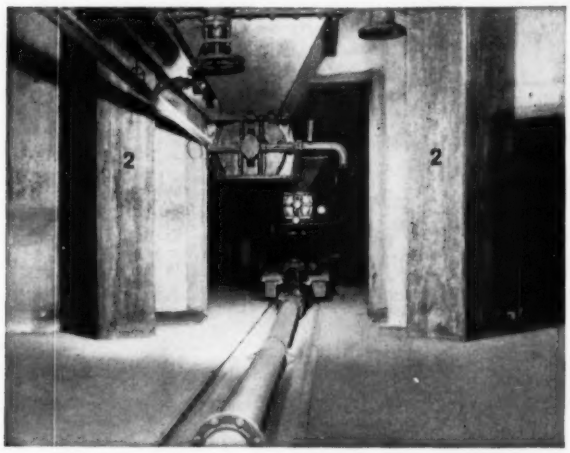
The Gas-O-Matic is a gas-powered fork lift truck designed to provide smoothness of acceleration, ease of maintenance, safety and operator convenience in addition to a 30 per cent reduction in fuel consumption. It achieves many of its operating advantages through a transmission system which incorporates neither clutch nor gear shift. It uses a gasoline engine, a variable voltage generator and an electric motor as its power system. Key element is the generator—an integral assembly with engine connected to the drive shaft. As engine rpm increases, voltage output of the generator builds up.

Travel speed is controlled by foot pressure on the accelerator. Travel direction is controlled by "forward" and "reverse" foot buttons, leaving the operator's hands free for steering, lifting and tilting. An added safety feature

Fuller-Kinyon 9-inch Type H Pump (left) conveys 80 tons of dry, raw materials an hour, a distance of 592 feet; the 8-inch Type H Pump conveys dry, pulverized material a distance of 502 feet from mills to silos.



Fuller-Kinyon 7-inch Type H Portable Pump conveys 400 bbl. of finished cement a distance of 398 feet from silos to packer bins.



# DRY, FINE MATERIALS PUMPED LIKE A FLUID

**with the**

**FULLER-KINYON**
CONVEYING SYSTEM

**Typical Materials Conveyed By Fuller-Kinyon Systems**

Asphalt filler dust
Barytes
Bauxite
Catalysts
Cement (Portland)
Cement raw Materials
Chalk
Clays (dried)
Coal (pulverized)
Coke dust
Dolomite (pulverized)
Feldspar
Flue dust
Fly ash
Fuller's earth
Gypsum (calcined)
Gypsum (raw)
Lime
Limestone (pulverized)
Magnesite
Manganese dioxide
Ores (pulverized)
Phosphate rock (pulverized)
Rock dust
Soda ash
Starch

Large quantities of dry, pulverized materials—aerated to the point of fluidity—can be pumped quickly to storage bins and silos, packer bins, bulk-loading stations and between processing points, *just like any fluid.*

The Fuller-Kinyon Conveying System has the advantage of stable operation under varying loads, and offers a wide range of capacities to choose from. The System's network of air-tight ducts allows materials to flow horizontally, vertically, and around corners . . . an economical arrangement for process plants with limited space in which to install pulverized material-conveying equipment.

If your present bulk handling system does not have these advantages—ask a Fuller engineer to survey your set-up. There's no obligation on your part, with a wealth of new facts to be gained on economical conveying.

**Fuller**

**DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—COMPRESSORS AND VACUUM PUMPS—FEEDERS AND ASSOCIATED EQUIPMENT**

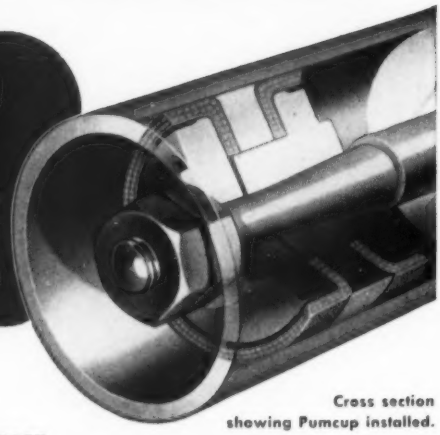
FULLER COMPANY
Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
420 Chancery Bldg., San Francisco 4

P-135

**For more facts circle 583 on Reply Card**

# PRESSURE UP! COSTS DOWN!

**Slippage Reduced**
in PUMPS
AIR CYLINDERS and
HYDRAULIC CYLINDERS
with
DARCOVA PUMCUPS



Cross section showing Pumcup installed.

NORMAL wear of ordinary packing reduces efficiency to a tremendous degree.

In contrast, Darcova Pumcups actually retain their efficiency . . . and they outlast most other packings at least 3 to 1!

Their scientific construction makes it possible to reach *and hold* peak efficiency. Under pressure Pumcups hug the cylinder walls to provide a uniform seal and exert full pressure where it is needed. This means reduced slippage, lower power costs and far less maintenance.

Write for helpful data-and-proof bulletins: No. 4502 on Pumcups for air and hydraulic mechanisms; No. 4401 on Pumcups for reciprocating pumps.

**Cost-minded engineers in many industries have standardized on Pumcups to solve their packing problems. The list of successful applications includes the following installations:**

**Die casting machines**
**Forming and drawing presses**
**Straightening presses**
**Pipe bending machines**
**Briquetting machines**
**Pusher mechanisms**
**Door control devices**
**Lifting and dumping devices**
**Spraying equipment**
**Proportioning pump regulators**
**Recoil cylinders**
**Air booster pumps**
**Grease guns**
**Automatic bottling and filling machines**
**Extrusion presses**
**Steering mechanisms**

DARCOVA
THE ORIGINAL COMPOSITION CUP

**DARLING VALVE & MANUFACTURING CO.**
WILLIAMSPORT 14, PA.

**PUMCUPS**

**For more facts circle 584 on Reply Card**


## NEW PRODUCTS

(Begins on page 126)

of this truck is the use of an exhaust chamber to eliminate the hazard of backfiring. By forced dilution of gas fumes with air and by directing the mixture upward and away from the operator, the danger of $CO_2$ poisoning is eliminated, company states. The Gas-O-Matic is now available in a 4000-lb capacity model. The Baker-Raulang Co.

### 29—ELECTRODE HOLDER is cooler and lighter unit

A cooler and lighter electrode holder for arc welding is announced. Manufacturer says there is less tendency for it to roll in the operator's hand because the jaw lever is placed close to the handle; a squeeze of the hand releases

the electrode stub. An enclosed spring and adjustment are provided for longer production duty. And reversible jaw insulators that can be reconditioned on the line are another feature.

The holder is described as exceptionally light for the work it performs because of its channel construction and its compound cam and lever action for parallel opening of jaws. It comes in 200-, 300-, 500-smp sizes. Welding Products Div., A. O. Smith Corp.

**It's easy to obtain product data with the postage-free Reader Service Cards on pages 35-36 and 157-158. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.**

### 30—FORK TRUCKS now available for LPG operation

A simple modification of the engine and installation of a compact "conversion unit" adapts standard gasoline-powered fork-lift trucks for operation on liquefied petroleum gas, this truck manufacturer announces, adding that the equipment is available for factory installation on the company's Truckloader, Clipper, Carloader and Dynatork Carloader models.

It is explained that in normal commercial usage, LPG (a mixture of butane and propane under pressure, is a desirable fuel because it burns clean without giving off obnoxious fumes and leaves no unburned carbon, lead compound or varnish deposits. And because it is a dry gas, there is no liquid to dilute the cylinder lubricant or crankcase oil, company points out.

# Saved → $16,000.00 in one year

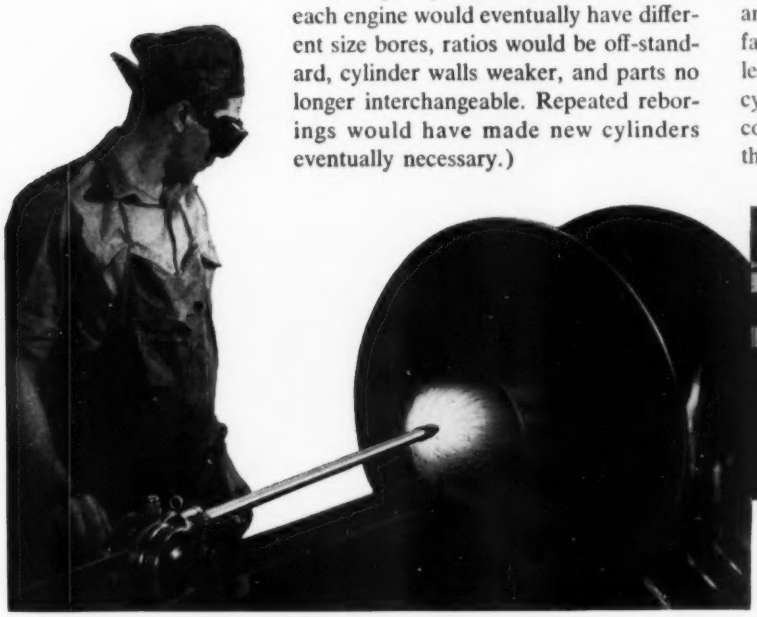
**How one plant saved $16,000.00 in one year on one type of machine repair, with metallizing.**

This large mid-West chemical plant uses fourteen gas engines, in compressor service, operating 24 hours a day. Fuel is a mixture of hydrogen, methane and air, with charcoal dust added to increase combustion efficiency.

Three methods of reconditioning these engines were available;

1. the cylinders could be replaced and standard sizes of other components preserved, at a cost of $450.00 per cylinder;
2. the cylinders could be rebored and fitted with oversized pistons and rings, at $400.00 per cylinder. (With this method, each engine would eventually have different size bores, ratios would be off-standard, cylinder walls weaker, and parts no longer interchangeable. Repeated reborings would have made new cylinders eventually necessary.)
3. Metallizing, at $125 to $150 a cylinder.

Cylinders are bored, threaded, grit-blasted, degreased and sprayed with Metcoloy #2 Stainless Steel, 20 to 30 pounds being applied. Cylinders are then finish-machined and honed to size. In the first year 64 cylinders were re-surfaced at a total saving of about $16,000.00, over the unsatisfactory method of reboring and fitting with oversized rings and pistons—$19,200.00 over the cost of new cylinders. Past experience with the greater particle hardness of sprayed metal, its better lubrication characteristics and the superiority of the stainless steel surface over the original cast steel cylinders leads this user to estimate that the rebuilt cylinders are good for another 15 years of continuous operation, about 50% more than the original life before reconditioning.



**ABOVE:** Gas engine—cylinders reconditioned with metallizing.

**LEFT:** Gas engine cylinder — being metallized while rotating in improvised jig set-up.

See other examples of metallizing illustrated in our 8-page Bulletin in your Sweet's Plant Engineering File—Section 7a/Me.

**Just One Example.** This is just one among many money-saving applications of metallizing in this plant. Almost any rotating or sliding machine part subject to wear, can be reconditioned with this modern repair process. Parts are kept to standard sizes, replacement stocks can be cut, and production "downtime" caused by delivery delays or shortages of new parts is eliminated.

**Further Information.** Send off the coupon for a call by a factory-trained Metco Field Engineer, or a copy of Bulletin 54, *"Metallizing Saves Money"*.

*The following trade names are the property of Metallizing Engineering Co., Inc., Metco*, Metcoloy *Reg. U.S. Pat. Off.*

**METALLIZING ENGINEERING CO., INC.**
38-14 30th Street — METCO METALLIZING — LONG ISLAND CITY 1, N. Y.
In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD., Chobham near Woking, England

**Don P. Watson**
**METALLIZING ENGINEERING CO., INC.**
**38-14 30th Street**
**Long Island City 1, N. Y.**

☐ Please have Metco Field Engineer call.

☐ Please send me, without obligation, "METALLIZING SAVES MONEY".

NAME_____

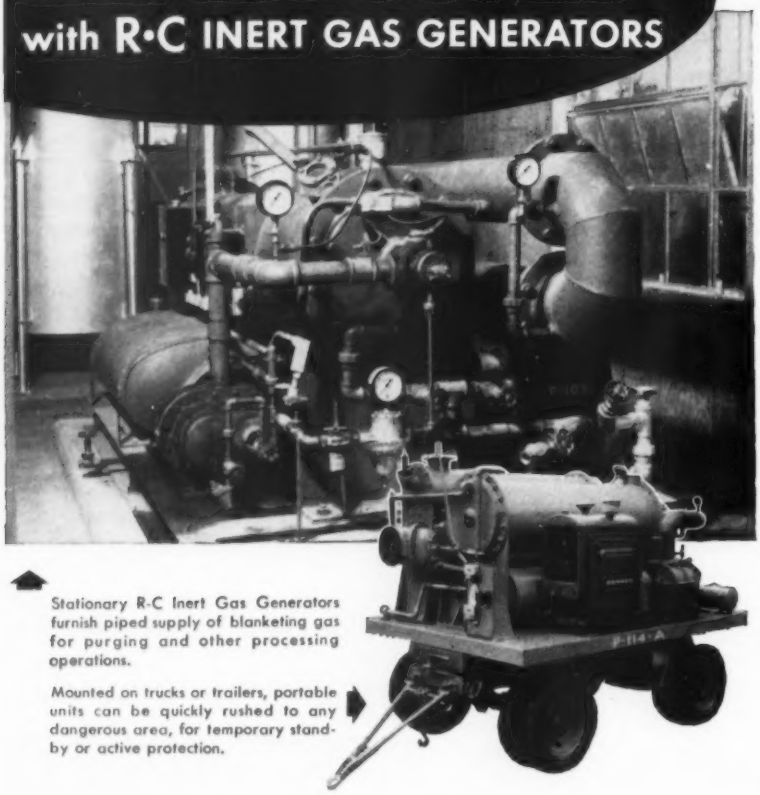
COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

**For more facts circle 585 on Reply Card**

# REDUCE EXPLOSION RISKS with R·C INERT GAS GENERATORS



Stationary R-C Inert Gas Generators furnish piped supply of blanketing gas for purging and other processing operations.

Mounted on trucks or trailers, portable units can be quickly rushed to any dangerous area, for temporary stand-by or active protection.

Where materials or processes may cause explosion-produced fires, such hazards can be greatly lessened by stand-by R-C Inert Gas Generators.

From stationary or portable units, a continuing flow of inert gas will blanket dangerous areas or can be used for purging explosive gas or liquid lines. Using either oil or gas as fuel, they operate at very low cost. Frequently, the comparatively small investment can be absorbed by more favorable insurance rates.

Units are available in capacities from 1,000 cfh to 50,000 cfh, with characteristics to match specific requirements. Write for details on how your fire and explosion risks may be reduced with R-C Inert Gas Generators . . . built by the specialists in equipment to handle gas and air.

ROOTS-CONNERSVILLE
Exclusive Specialists in Handling Gas and Air

ROOTS-CONNERSVILLE BLOWER A DIVISION OF DRESSER INDUSTRIES, INC.
534 Planton Ave. • Connersville, Indiana

For more facts circle 586 on Reply Card


# NEW PRODUCTS

(Begins on page 126)

To adapt an engine for LPG operation, it must be modified to operate at a high compression ratio (8 to 1) to take advantage of LPG's higher octane rating and provide fuel economy. Also, a cold intake manifold is used, since the fuel is already a gas when it enters the manifold. Basically, the conversion unit consists of a heavy-duty fuel tank, vaporizer regulator and air-gas carburetor. Since the fuel is under its own pressure in the tank, there is no fuel pump. A solenoid valve automatically opens or closes the fuel line by the ignition switch and serves as a lock-off when the engine is stopped. Clark Equipment Co.

## 31—PENETRATING OIL to prevent damage by rust

Penetrol is described as a highly dispersible oil that penetrates quickly to the base metal on exposed or tightly closed surfaces such as joints. It is claimed to have unusual ability to prevent and inhibit damage caused by oxidation of iron and steel, utilizing the rust (iron oxide) to form a protective coating which offers an excellent foundation for paint.

According to manufacturer, Penetrol has three major uses: to stop rust action on steel without need for removing the rust; to act as a reinforcing additive for practically all air-drying oil type maintenance paints (except lacquer, plastics, rubber or water-base paints and coal tar materials.); and to serve as a vehicle for aluminum paste or powder. Descriptive literature and a pint of Penetrol are available to qualified plant engineers, who include their job title and company name along with this request. The Flood Co.

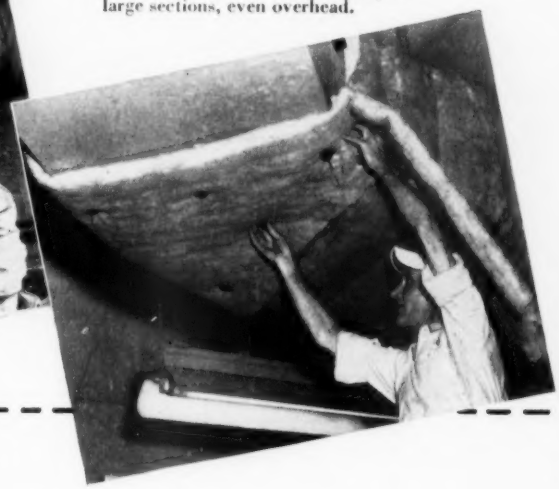
## 32—HYDRAULIC JACK of 35-ton capacity, new design

Described as appreciably lighter in weight than many jacks of like capacity, this new 35-ton hydraulic jack weighs only 55 lb and incorporates several noteworthy design features. One of these is an automatic air vent

said to eliminate 90 per cent of "air lock" difficulty, and to permit the use of smaller reservoir and thus a smaller, lighter base. In this design the air vent screw and adjustments are eliminated and, with no air vent set screw to open or close during operation, a

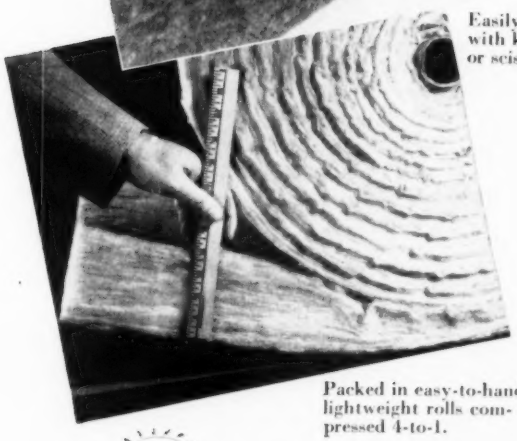
Flexible MICROLITE blanket conforms readily to irregular shapes.

Extremely light in weight with good tensile strength for easy handling in large sections, even overhead.



# When you've got ducts to wrap...

## You'll save time— You'll do it easiest— with MICROLITE



Easily cut with knife or scissors.

Packed in easy-to-handle, lightweight rolls compressed 4-to-1.

**MICROLITE** ***Glass Fiber Insulating Wool*** is a natural for wrapping ducts. It's soft—it's resilient—it's pleasant to handle—it's easy to cut.

Extreme light weight of Microlite minimizes attachment and mounting points—without danger of insulation sag. Weighing only ½-pound per cubic foot, enough B-305 Microlite to provide 1″ of insulation on a 1′ x 2′ x 100′ duct weighs only 50 pounds.

Inch for inch, Microlite is one of the most effective of all insulating materials. Half-pound density Microlite has a "k" factor of .25 at 50° mean; a Noise Reduction Coefficient for 1″ thickness of .60. You can't conscientiously proceed with any insulating job until you've investigated Microlite, a product of Glass Fibers exclusive electronic-extrusion process. Write for descriptive Microlite brochure and detailed duct application manual. Glass Fibers Inc., 1810 Madison Avenue, Toledo 2, Ohio.

# GLASS FIBERS INC.

*Makers of glass fibers by the ELECTRONIC-EXTRUSION process—developed, patented and used exclusively by Glass Fibers Inc.*

VITRON Yarns • Rovings • Micro-Fibers • Pipe Wraps • Industrial Mats • MICROLITE Thermal and Acoustical Insulation
DURAMAT Vapor Barriers • VIBRAGLASS Mounting and Packaging Materials • COUSTIC-AIRE and THERMO-JET Aircraft Insulations.

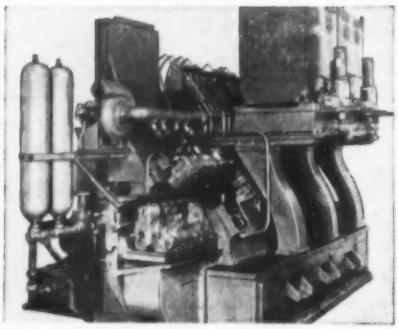
**For more facts circle 587 on Reply Card**

# GREER TOPICS

**Functions and Applications of the Greer Accumulator**

Bunell's automatic cylinder trimming and forming machine incorporates two Greer accumulators to cut motorpump unit size by 50%. Slashed cost $600, weight 400 pounds and saved substantial floor space. Simpler circuit used few fittings for less maintenance.

## How Greer Accumulators Reduce Power Requirements



Kreuger's huge Insert Valve Press uses 4 Greer accumulators to supply power needed to insert valves in auto cylinder blocks. The Greer accumulator reduced motor and pump requirements and assured the smooth, even flow of oil under pressure on circuit demand.

### They store tremendous power in small space—deliver it instantly on demand of hydraulic system

As a primary source of hydraulic power where the work cycle does not depend on the flow of the pump or as auxiliary power in intermittent duty systems, the Greer accumulator has its most dramatic effects. In these applications, the Greer accumulator can save a great deal of power, reduce size and cost of equipment, and develop a much more efficient hydraulic circuit.

This compact and economical power package, with its unmatched ability to store power in small space, accumulates energy from the pump and delivers it instantly as required by the circuit, permitting small motors to do the work of big ones. For practical applications, read about the installation of Greer accumulators on the equipment as shown in photographs above and on left.

Greer's staff of expert hydraulic engineers are available for a discussion of your problem without obligation. Call or write Greer today.

### Greer Hydro-Pneumatic Accumulators have many other diversified functions

(1) Pressure storage chamber for main, auxiliary and emergency power (2) Pressure-volume compensator for leakage and temperature (3) Dispenser of fluids and lubricants (4) Transfer-barrier for fluids and gases (5) Shock absorber for line shock and pump pulsation.

*Precision engineered to make any hydraulic system better! Complete data and diagrams in Brochure 301. Write for your free copy.*

GREER ACCUMULATORS

U.S. PATENTS UNDER OLAER LICENSES

**Greer Hydraulics Inc. 454 Eighteenth Street, Brooklyn 15, New York**

Field Offices: 1908 West Cermak Road, Chicago, Illinois • 25 South Main Street, Dayton, Ohio 2832 East Grand Boulevard, Detroit, Michigan • and sales representatives in all principal cities

**For more facts circle 588 on Reply Card**


# NEW PRODUCTS

(Begins on page 126)

fluid leaking point is eliminated, manufacturer explains. A single pump with longer stroke is used to provide more rapid lift with less pumping motion. Bulletin AD-29 describes this jack. Duff-Norton Mfg. Co.

### 33—FLAT-GLASS GAGES for boiler water levels

Greater dependability, longer gage life and more accurate water level readings in high pressure service are advantages claimed for this new separated-design water gage assembly. The gage glass inserts are company's pressure-sealed "floating assembly" type; gage valves are company's Welbonds.

On gages for wide range of visibility greater flexibility is gained by using two independent inserts and by interconnecting expansion loops. On gages for medium ranges, using one insert, a single expansion loop is used. The lower flanged connection and upper flanged loop connection are designed to eliminate stuffing boxes, and the short lower flanged connection to eliminate the cold water leg and afford greater accuracy in level reading. Tie-bar-type water column linking provides circulation to keep gage nearer drum temperature. Yarnall-Waring Co.

### 34—POWER DRIVE is small and light in weight

The Model D is claimed to be lightest and smallest of all-purpose power drives. By replacing the old cast steel-iron metal housing and chuck with aluminum, manufacturer has cut the total weight to about 100 lb. Other design changes include more convenient location of switch; lever safety-lock on switch; and bronze spindle bearings.

The new unit can be used easily on bench, truck or with pipe legs right on the job location. Large side openings serve for motor ventilation and hand grips for moving. Tools are stored on the flat top. Like company's Model-C, the Model-D has a heavy duty ⅛- to 2-in. chuck; enclosed gears running in oil, and weatherproof motor. Beaver Pipe Tools, Inc.

### 35—TOGGLE SWITCHES meet AN, JAN specifications

Two new series of toggle switches are announced as conforming to Army-Navy Aeronautical and Joint Army-Navy specifications. The switches have riveted solid silver contacts to prevent loosening and provide maximum conductivity heat dissipation, and a copper moving contact carrier for maximum

**Model 622 – Ultra-Sensitive Instruments**

Portable d-c and a-c thermo instruments for precision measurement of potentials and minute currents in electronics or laboratory research.

# *Specialized and Multi-purpose* INSTRUMENTS

*for*

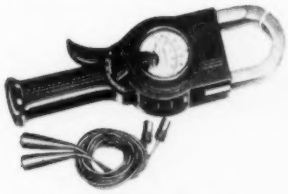
- **RESEARCH**
- **PRODUCTION**
- **MAINTENANCE**

For complex, or just routine measurement jobs, these and other specialized WESTON Instruments save time and assure dependable measurements. For information on the complete line, see your local Weston representative, or write . . . WESTON Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.

**WESTON** *Instruments*

**Model 901**
**Portable Test Instruments**

Available in d-c, Model 901 –and a-c, Model 904, single and multiple ranges of wide coverage. Excellent scale readability and shielding. Accuracy within ½ of 1%.

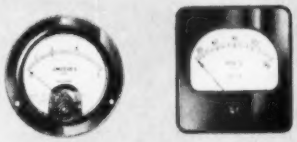


**A-C Clamp Volt-Ammeter**

(Model 633, Type VA-1) For convenient and rapid measurement of a-c voltage and current without breaking the circuit. Jaws take insulated or non-insulated conductors up to 2" diameter. Safe, rugged, versatile. Also available as a-c clamp ammeter, without voltage ranges.

**Sensitive Relays**

A line of sensitive relays including the Model 705 which provides positive operation at levels as low as ½ microampere. Non-chattering magnetic contacts handle up to 10 watts at 120 volts.

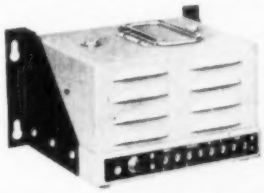


**Panel and Switchboard Instruments**

A complete line of instruments in all types, sizes and ranges required for switchboard and panel needs . . . including d-c, a-c power frequencies and radio frequency, rectifier types and D.B. meters.

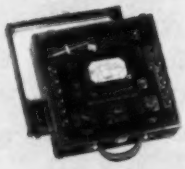
**Model 697 Volt-Ohm-Milliammeter**

One of a line of pocket-size meters, Model 697 combines a selection of a-c and d-c current, and resistance ranges. Ideal for maintenance testing and many inspection requirements.



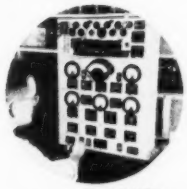
**Model 1411 Inductronic D-C Amplifier**

Stable amplifier provides high degree of resolution even at fractional loads. Reaches steady full scale deflection in a fraction of a second. Interchangeable plug-in range standards for either microamperes or millivolts.



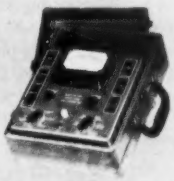
**Industrial Circuit Tester – Model 785**

A multi-range, multi-purpose, ultra-sensitive analyzer, for laboratory and industrial checking of electrical and electronic circuits. Has 28 practical scale ranges; measures d-c and a-c voltage, d-c and a-c current, and resistance. Accessories available to extend ranges. Compact and portable; furnished in either oak or steel case.



**Model 686**
**Electronic Tube Analyzer**

Tests tubes under exact operating potentials. Accurately determines true mutual conductance of all tubes, in accordance with manufacturers' rated operating conditions, or under special operating conditions.



**High Frequency Electronic Analyzer**
**Model 769**

A three-in-one instrument providing a self-contained Volt-Ohm-Milliammeter, a high impedance electronic D-C Volt-Ohmmeter, and a probe type Vacuum Tube Voltmeter for use to 300 megacycles. Exceptionally stable and accurate. Has specially designed extremely small RF and D-C probes.

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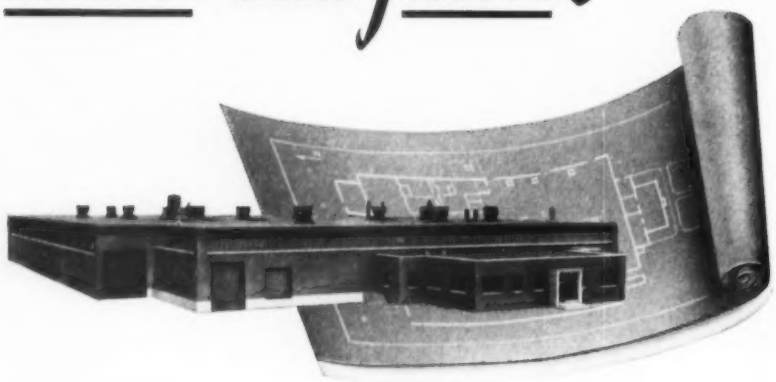
# better—and faster!



*The George Sall Metals Co., Inc., Philadelphia, Pennsylvania*
*Designed and Constructed by The Kuljian Corporation*

Thanks to single control teamwork between owner-management on one hand, and engineer-constructor on the other, the new George Sall Smelting Plant in Philadelphia produces non-ferrous metals and alloys from scrap metal at higher speed and with greater uniformity and purity than ever before.

The Kuljian Corporation, under a single contract, designed and constructed this modern plant which today is the envy of the industry.

Backed with years of experience in many diversified industries, The Kuljian Corporation offers you the following services:

**1. ENGINEERING**—Preliminary studies and layouts followed by complete detailed working drawings and specifications; the service of a resident engineer during construction is optional.

**2. CONSTRUCTION**—Management of the over-all project including coordination of all subcontractors and all directly employed field forces; accounting and purchasing services are optional.

**3. ENGINEERING AND CONSTRUCTION**—Both of the above services on a single contract with unified responsibility for the project from preliminary studies to completed construction.

The Kuljian Corporation

ENGINEERS • CONSTRUCTORS

1200 North Broad Street, Philadelphia 21, Pa.

MEXICO CITY • CARACAS • MADRID • ROME • ATHENS • TOKYO • CALCUTTA • BAGHDAD • FRANKFURT

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# NEW PRODUCTS

(Begins on page 126)

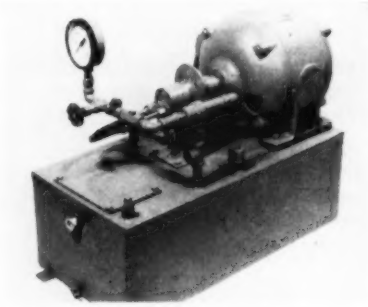
conductivity and minimum temperature rise. Momentary versions are built without return springs.

One of the series, the IITS, consists of nine single-pole toggle switches with either maintained or momentary contact position variations. They are bushing mounted and a packet of fittings for mounting is included with each switch. This series has a sealed toggle lever to prevent foreign matter from entering the switch case through the toggle bushing.

The other series, 3ITS, includes eight three-hold mounting type single-pole toggle switches with maintained or momentary contact position. Although placement and diameters of mounting holes conform to AN specifications, the switch body is said to be substantially smaller and lighter than maximum specified. Micro Div., Minneapolis-Honeywell Regulator Co.

## 36—PUMPING UNIT designed for low gpm operation

This compact new hydraulic pumping unit is declared applicable wherever there is need for a low cost hydraulic pressure unit. It has an all steel welded reservoir and Nitraloy gear pump in



high strength aluminum alloy case. The unit is completely piped with relief valve, check valve, reservoir filter and air breather filter. It is designed for pressures to 1200 psi, capacities of 0.8 to 2.8 gpm. It's available with or without motor. Hackett Brothers, Inc.

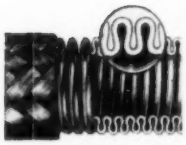
## 37—PLASTIC PROTRACTOR is adjustable, versatile tool

The Tractograf is called a miniature drafting machine in itself. According to manufacturer, any number of angles from zero to 180 deg can be drawn instantly without turning, sliding or moving the protractor out of position. You simply swing the upper rule arm to the desired angle and lock the adjustment knob. A magnifier, built-in over the registration mark, gives clear, hairline adjustment. Also contributing to easy reading is the white dial and the 180-deg arc calibrated in 1- and 5-deg divisions.

Frequently-needed mathematical formulae are printed on the reverse

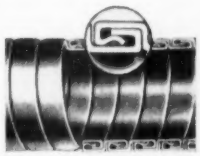
# CMH

## One dependable source for every flexible metal hose requirement



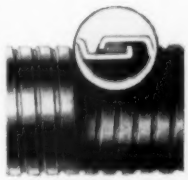
CMH corrugated hose is available with metal braid covering or unbraided in steel, bronze or stainless steel. Used where great flexibility is required at high temperatures and high pressures. Sizes range from 3/16" I.D. to 24" I.D. Depending on size, type and material, it will handle burst pressures to 12,000 psi, temperatures to 1200° F.

CMH interlocked hose is available in various types, packed and unpacked, in steel, stainless steel, bronze, aluminum, brass and other metals. It is used for steam, exhaust, tar and asphalt, etc. Sizes ½" to 12", I.D. Depending on size, type and material, it may be used for working pressures to 750 psi (constant), temperatures to 600° F.



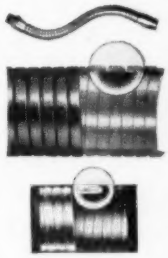
CMH double groove (ball bearing design) hose is available in bronze, steel or stainless steel with asbestos packing and with or without metal braid covering. Widely used for non-searching liquids and gases at low to moderate pressures and temperatures. Sizes range from 5/32" to 1¼", I.D.

CMH square locked hose is available unpacked or with a choice of several types of packing in steel, bronze, brass, aluminum, stainless steel, etc. It is used as conduit, cable armor, nozzles and many similar applications. Sizes range from 3/16" to 1", I.D. Normally used only at very low pressures.



*For full information on all CMH hose products write for Catalog 130 or see the Flexonics catalogs in Sweet's Plant Engineering File, Chemical Engineering Catalog and The Refinery Catalog. For maintenance hose, see the classified pages of your telephone directory for the name of your CMH distributor.*

Standard assemblies and special purpose flexible metal hose items are manufactured for such services as steam, tar and asphalt, machine tool coolants, machine tool wiring conduit, dry granular products. We will be pleased to send data on any specific requirement.



**CHICAGO METAL HOSE Division**

Flexon identifies CMH products that have served industry for over 50 years.

CMH

**Flexonics** *Corporation* 1340 South Third Avenue, Maywood, Illinois

In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

Flexible metal hose

Expansion joints

Aircraft components

Metallic bellows and bellows assemblies

For more facts circle 591 on Reply Card

# Why 1 when you can transport 4

## WITH THE MERCURY FORK TRUCK— TRACKLESS TRAIN SYSTEM

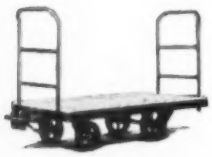
If your fork trucks travel over 150 feet (maximum)—you can save time . . . money . . . man power with the fork truck—"trackless train system."

In the system *trailers* do the transporting job — the fork truck loads the trailers . . . hauls the train . . . unloads and stacks at destination. And if your volume is large and distances great an electric tractor may be the best bet for the hauling job.

Let a MERCURY sales representative actually demonstrate the increase in efficiency the addition of trailers will make in your handling system. There is no obligation. Use the convenient coupon.

Mercury "Jeep" Fork Truck loads, hauls and unloads A-310 Trailers at grocery warehouse.

Mercury "Jeep" Fork Truck loads A-310 Trailer train to be hauled by a Mercury "TUG" Electric Tractor.



Model A-310 Trailer (4000 lb. capacity) with the "Safety-Self-Coupler" for "Trackless-Train-System" operation.

*Over 41 years experience designing, manufacturing, installing materials handling equipment.*

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# NEW PRODUCTS

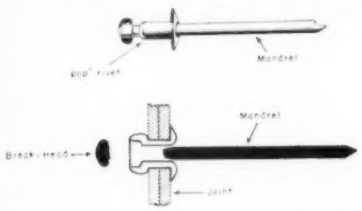
(Begins on page 126)

side of the dial, and there's a handy 5-in. rule on the lower arm. The Tractograf is 2-in. wide, 7-in. long when set at zero. The list price is less than $2.00. Way-Mac Mfg. Co.

## 38—FAST-WORKING RIVET can handle "blind" spots

A rivet that cuts costs, makes blind spots as easy to handle as open sections and can be driven without a dolly is announced for the American market—it was developed in England. This rivet can be driven by inexperienced operators, including women, at a rate of up to 1200 an hour, it is stated. It is available in Monel and aluminum and can be used to fasten most commercially available metals and alloys.

Known as the Pop Rivet, this fastener consists of the rivet itself and an inserted mandrel of high strength



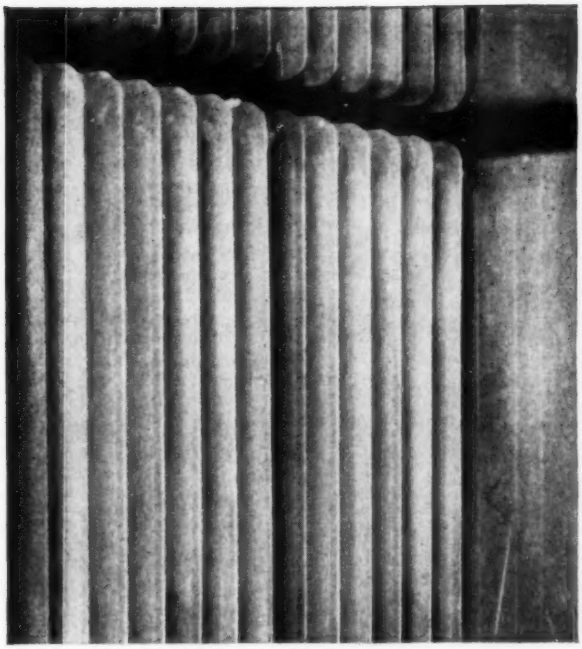

steel. The mandrel, with its attached rivet is slipped either into pre-drilled holes in the work, or onto the fastening tool and then into the hole. The fastening tools can be operated manually and pneumatically, can be fitted with interchangeable heads and extensions to operate at any angle.

According to company Pop Rivets are more economical than most blind rivets that can be applied by one operator. The Monel rivets come in sizes from $\frac{7}{64}$ to $\frac{3}{16}$ in. dia in lengths from 0.190 to 0.750 in., and cost from $4.73 to $22.84 per thousand in these sizes. The International Nickel Co., Inc.

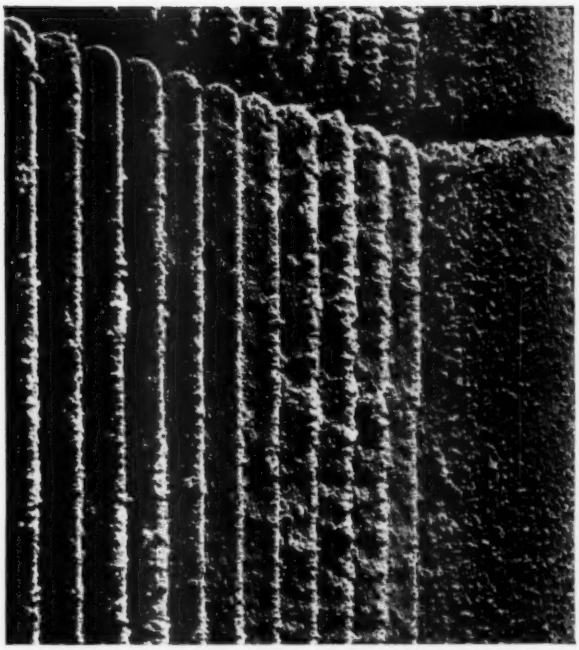
## 39—DEMOUNTABLE WHEEL has thick rubber tread

This wheel, the Rapistan MB, has a "bonded-to-steel" rubber tread that won't slip, stretch or creep under heavy loads, manufacturer announces; and it offers longer service life and long-run economy. Its replaceable tire has a thick live-rubber tread bonded to a steel band. This steel band cannot warp, stretch or spread during molding operations or in use, it is pointed out.

The fast tire replacement feature of this demountable industrial wheel is intended to eliminate the expense of discarding the entire wheel or the delay of having it retreaded when worn down. The Rapistan MB has a one-piece hub with retaining ridge that locks the entire assembly to the wheel discs to prevent shifting under side thrust. It is



**Before**—PRECIPITRON® cells in close-up show clean aluminum collector plates. This is the way they appear after periodic washings, which dispose of all trapped airborne particles.



**After** only 2½ weeks cleaning "normal atmospheric" air, the same plates had accumulated this much dirt. PRECIPITRON stops airborne dirt, pollen, mists—even germs and smoke!

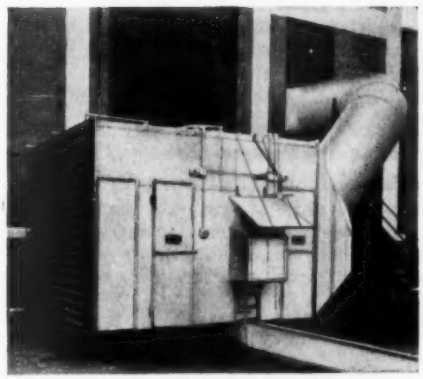
# ELECTRONIC BARRIER

## AGAINST INVISIBLE DIRT

Airborne particles are costly everywhere. For example, corrosive specks can mar the finished surface of finely machined parts. Contamination is dangerous in laboratories and food processing plants. In textile mills, airborne specks streak the yarns. In processes, buildings, offices—even in homes—"invisible" dirt costs you money.

But PRECIPITRON—the electronic air cleaner—will take *all* the dirt out of the air. It removes particles so tiny they can be seen only with an Ultra Microscope. The savings in controlling airborne dirt with PRECIPITRON are worth looking into today.

To help you *put air to work*—with air cleaning, air conditioning or air handling—Westinghouse offers a complete equipment line. For a free copy of General Catalog 600, call your local Westinghouse-Sturtevant Office. Or, write to Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Mass.



Cleaning efficiency of PRECIPITRON is 90% or better at 333 fpm. Dirt is held on the plates until washed down. A garden-type hose flushes it directly into the drain—quickly, easily, inexpensively.

**YOU CAN BE SURE...IF IT'S Westinghouse**

**AIR CLEANING**

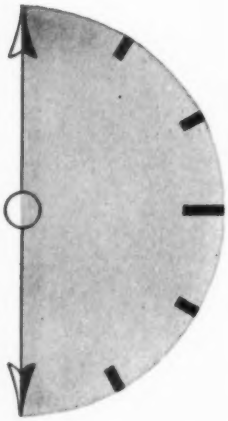
J-802278

**For more facts circle 593 on Reply Card**

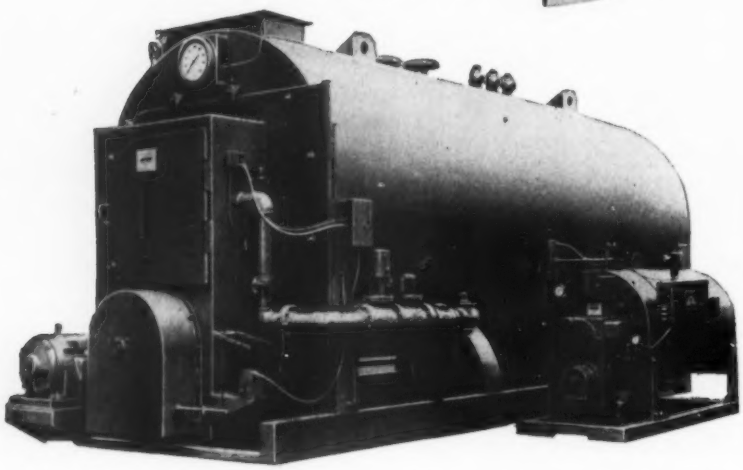
**30** . . . it takes only **30** minutes to open a

# Continental Boiler

for cleaning or inspection



Sizes from 20 to 500 hp, high or low pressure



With a Continental you'll hold boiler down-time to a minimum because the clean-out-and-inspection-doors at both ends are hinged and can be handled *easily* by *one* man.

But that's only one of the construction features. Here are others:

**ADVANCED TWO PASS DESIGN**—eliminates baffles that may break during operation, causing gases to by-pass and destroy efficiency. *With the Continental,* 80% efficiency is *guaranteed.*

**LONG SERVICE LIFE**—The use of forced draft and the elimination of baffles results in uniform distribution of heat through all tubes. This insures long life because all tubes do equal work.

**MAXIMUM HEAT TRANSFER**—Fuel is not burned in a refractory-lined furnace but is fired directly into the firing tube which is surrounded by water. This assures maximum heat transfer, complete combustion, a high $CO_2$ and a low stack temperature.

**BURNERS—OIL AND GAS**—*Continental's exclusive firing method saves fuel.* The *oil burner* uses a pressure atomizing type nozzle which is easy to service—no cups or moving parts to wear out. The *gas burner*—rather than premixing—mixes the fuel and air at the point of ignition, thus producing a uniform, highly radiant flame.

Continental Boilers are shipped tested and ready to operate. No special stack, foundations or connections required.

Find out how low Continental is in *initial* and *operating* cost: Write for Catalog 102.

*CONTINENTAL is sold, installed and serviced by competent distributors throughout the U. S.*

**BE BOILER ENGINEERING AND SUPPLY COMPANY, INC.**
2 Manavon Street • Phoenixville, Pa.
*40 Years of Boiler Manufacturing*

For more facts circle 594 on Reply Card


# NEW PRODUCTS

(Begins on page 126)

made in 6- and 8-in. sizes with a 1⅞ in. width tread in either cushion-rubber or Neoprene. Load ratings are 400 and 500 lb. The Rapids Standard Co., Inc.

## 40—WATERLESS CLEANER gets hands clean quickly

This liquefying, waterless hand cleaner is intended for removing just about everything that soils the hands—dirt, grease, paints, oils, carbon and tar. Latest addition to company's No. 7 line, the cleaner is announced as economical, since a teaspoonful or two is all that's needed for a washing, and as fast acting. Cleaning is by solvent action, the cleaner turning from a cold cream consistency to a liquid in a few seconds contact with the hand, reaching the crevices of the skin and dissolving grease and grime. Then hands are wiped clean with cloth or paper towel.

Manufacturer says this cleaner is less irritating than gritty cleaners and that it contains lanolin. It comes in 7- and 28-oz cans equipped with a double friction lid which protects the material. The large can is expected to retail for $1.50. E. I. duPont de Nemours & Co.

## 41—LEVER CONTROL for variable speed motors

To maintain automatic speed regulation of such mechanisms as air cylinders, follower rolls and conveyors which have a movement proportional to the desired speed range, a new lever control has been developed for this company's Varidrive Motors. The driven equipment can be mechanically linked to the lever. Maximum and minimum speeds may be pre-set by adjustable speed stops located on the exterior. The lever may be assembled by the user in any of four radial positions spaced 90 deg apart. Full speed range is achieved with only a 60 deg arc of the lever. Bulletin 1797 describes this control. U. S. Electrical Motors Inc.

## 42—PALLET TIERING TRUCK is hydraulically operated

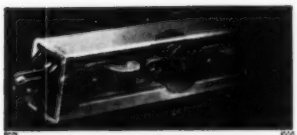
Designed for use in small plants and warehouses, the Pallet Stacker is also suggested as an auxiliary unit in larger plants. It has a ¾ hp motor-driven pump which will tier pallet loads as high as 115 in, with an 8 fpm rate of elevation. The truck has a push-button remote elevating control and a hand-valve lowering control.

Base forks on the Pallet Stacker have six adjustments for handling pallets from 30- to 48-in. wide. The truck's compact design permits operation in narrow storage aisles, boxcars. Its mast extends 138¾ in. elevated, measures 83 in. collapsed. Weighing approximately 1300 lb, this truck has a rated capacity of 2000 lb. Manufacturer says its lighter weight and smooth-rolling wheels enable it to be operated easily by one person. A bulletin describing it in detail is offered. The Raymond Corp.

# Save Space! Cut Costs!

## with R-W "Zig-Zag"®

## *Continuous Power Conveyor*



**Engineered for Economy and Flexibility**

- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations.
- SAFE—all moving parts are fully enclosed.
- Low first costs. Low Power Factor.
- Standard horizontal or vertical curves —two-foot radius.

Richards-Wilcox ZIG-ZAG Continuous Power Conveyors are the last word in materials handling efficiency. Products of many sizes and shapes are carried at various speeds, smoothly and safely. Loss through handling mishaps is reduced to a minimum. And the overhead installation releases valuable space for other uses —increases the efficiency of the plant many times.

ZIG-ZAG—a steel, tube-like track through which travels a specially constructed motor-driven chain—will carry unit loads up to 125 pounds at speeds ranging from 1 inch to 60 feet per minute. It's designed to go up and down, in and around "like water through a pipe." And ZIG-ZAG is flexible, too—if changes or relocation are required you can take it down here and put it up there, and in most cases, *use all the parts!*

* * *

*Learn how patented ZIG-ZAG can save space and cut production costs. Send today for details—or better yet, have an R-W engineer consult with you at no obligation.*

1880 RICHARDS WILCOX R-W AURORA TRADE MARK 1953

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**Richards-Wilcox Mfg. Co.**

"A HANGER FOR ANY DOOR THAT SLIDES"

460 THIRD STREET, AURORA, ILLINOIS

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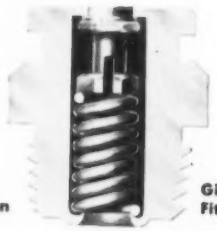
There's All the Difference in the World
in Grease Fittings!

UNIVERSAL

Specify
UNIVERSAL'S
New Giant Button Head
or Flush Type Fittings

Streamlined
One-Piece Design



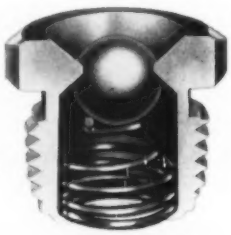
Giant Button Head
Fitting, Plug Check

One-piece streamlined construction provides ample protection from damage by accidental blows. Positive seating of ball or plug check, supported by small but powerful spring, controls back-pressure and prevents leakage. Special spring design assures maximum clearance for free passage of grease.

When you need grease fittings for original equipment or replacement, specify UNIVERSAL and get a **better** fitting at no greater cost.

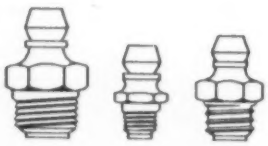
**Application engineering available promptly on request. Write now for complete information.**

Streamlined
One-piece Design



Giant Flush-Type
Fitting, Ball Check

Complete Line of
Hydraulic Fittings



UNIVERSAL LUBRICATING SYSTEMS, INC.

773 ALLEGHENY AVE., OAKMONT, PA.
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# NEW BOOKS

## for the plant engineer

### Automation, Atoms and People

**MANUFACTURING SERIES.** Published by American Management Association, 330 West 42nd St., New York 36, N. Y. Price $1.25 (non-members), $1.00 (members).

AUTOMATION AND OTHER TECHNOLOGICAL ADVANCES, No. 205, 55 pp. Problems in the push-button factory and the role of design in automation are two of the papers that this booklet presents on automation developments. Current industrial uses of radioactive material, and materials substitution are other papers that are included.

MAKING THE MOST OF YOUR HUMAN RESOURCES, No. 208, 76 pp. This publication carries information on the selection of better supervisors. It gives short abstracts of tests that were given to check the differences in foremen. One paper tells how to use existing technical personnel to better advantage. Another covers wage incentives. Panel session proceedings relating to the organization of manufacturing executive's jobs also appear in the booklet.

INDUSTRY ENTERS THE ATOMIC AGE, No. 210, 31 pp. The use of radioisotopes in manufacturing operations, the place of the manufacturer in atomic energy, and the meaning of atomic energy to industry are the timely papers that are offered in this publication.

### Pneumatic Power

**COMPRESSED AIR in Mining and Industry. Size 8½ by 5⅜ in.; 170 pp including index; illustrated; cloth bound. Published by Pitman Publishing Corporation, 2 West 45th St., New York, N. Y. Price $4.00.**

THE VERSATILITY of compressed air is pointed out to the reader in this comprehensive and general coverage of the subject. This book is not a scientific treatise, filled with complicated theory and calculations. Instead, it is a relatively simple presentation of the many applications of pneumatic power and related subjects.

Tips are given on installation requirements of air compressors since important factors are sometimes overlooked when a new machine is being considered. A variety of types of machines is illustrated and discussed.

The section on compressed air in industry covers applications in the aircraft industry, cement works and automobile making among others. In the chapter on the elimination of moisture, oil, dust and heat, there is material on intercoolers, after-

# GOT A PROBLEM IN TRADE WASTE TREATMENT?

If you have a problem of recovering a valuable or important component from the liquid waste of your plant . . . or if the waste from your plant is noxious or detrimental to the public . . . why not have a Chain Belt Company Waste Treatment Engineer help you find an efficient, economical solution. With broad experience in industrial waste treatment methods, these practical experts can assist you and work with your engineers in obtaining the most effective system of treating waste to avoid stream pollution, abate nuisances, recover fats, oils, foundry sand, water and many other heretofore wasted materials. Equipment for continuous flow processes is available in the Rex Line for sedimentation, screening, flotation, flocculation and concentration. In many applications, a Rex Trade Waste Treatment installation has more than paid for itself in savings it effected.

For complete information on how Chain Belt Trade Waste Specialists and Rex Trade Waste Treatment Equipment can assist you, mail the coupon.

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( ) I would like to have a Field Engineer call
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Company.....
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City.....State.....

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# CLARAGE *Multitherm* AIR CONDITIONING UNITS

***. . . . year-'round comfort at low cost***

Clarage Multitherm Conditioning Units are double duty machines. They keep your place cool and dehumidified in summer. They heat and humidify in the wintertime.

You save considerable in cost by having the same equipment working for you the year-'round . . . and every day you're assured of comfortable working conditions.

Multitherm Units come in vertical and horizontal types as shown—ten sizes—capacities 600 to 20,500 c.f.m.

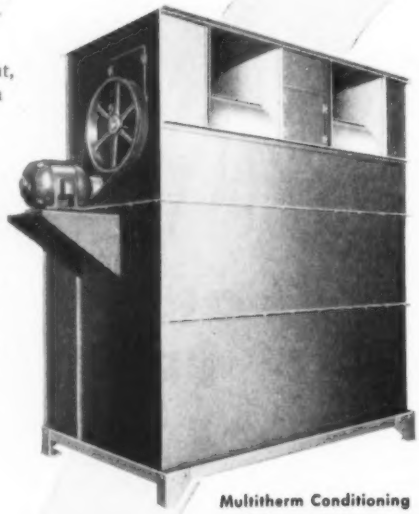
You use a direct expansion refrigerant, cold water or brine for cooling; steam or hot water for heating.

***. . . . or process conditioning***

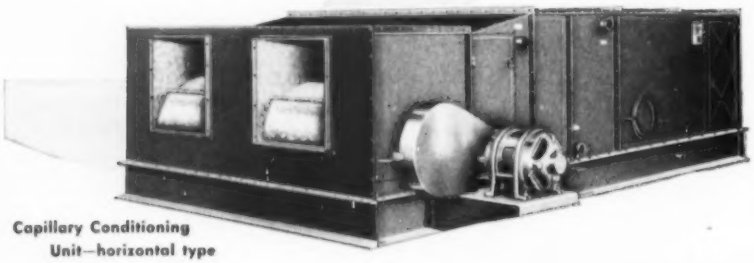
Aside from comfort applications in offices, plants, stores, etc., Multitherm Units are widely used in industry where production depends upon a certain temperature and humidity...and Clarage Capillary Conditioners are available where extremely close control is needed.

We welcome your inquiry for any desired information.

**CLARAGE FAN COMPANY**
**Kalamazoo, Mich.**



**Multitherm Conditioning Unit—vertical type**



**Capillary Conditioning Unit—horizontal type**

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**CLARAGE**
*Headquarters for Air Handling and Conditioning Equipment*
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

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coolers; formulas which have a bearing on the capacity of receivers are included. Other sections cover portable compressors, pneumatic tools, care and treatment of pneumatic tools and lubrication.

## Team Report on Machine Tools

**METALWORKING MACHINE TOOLS. Prductivity Team Report. Size 7 by 10 in.; 88 pp; hard cover backing. Published for the Team by the British Productivity Council, 21 Tothill St., London, S.W. 1, England. Available in United States from Office of Technical Services, Department of Commerce, Washington, D. C. Price 90 cents.**

THIS BOOKLET covers the report of the Productivity Team, representing the British Machine Tool Industry, which visited the United States in 1951.

The findings of the Team are given under the following variety of headings: materials handling, workshop methods, costing and cost control, labor engagement and training, including apprenticeship, labor unions and agreements, methods of worker remuneration, incentives, trends in design and others. They also compare the relative productivity of American with British industry.

## Supervisor's Helper

**SUPERVISOR'S MEMOS & QUOTES. Size 3¼ by 5¾ in. May 1953 issue, 64 pp; illustrated; paper bound. Published by Executive Services Incorporated, 3 Clift St., Mystic, Connecticut. Price $3.00 per year, (less for quantity orders).**

PUBLISHED monthly, this booklet carries educational matter as well as conveniently marked spaces for daily record and note keeping. The first few pages present a short review of national industrial developments.

Useful formulas and technical data are also offered by the booklet. A portion of the calendar appears on the back cover. This includes the current month, the preceding and following months.

The handy supervisor's aid is protected against perspiration and grease by an acetate cover.

## Businesses Built on Welding

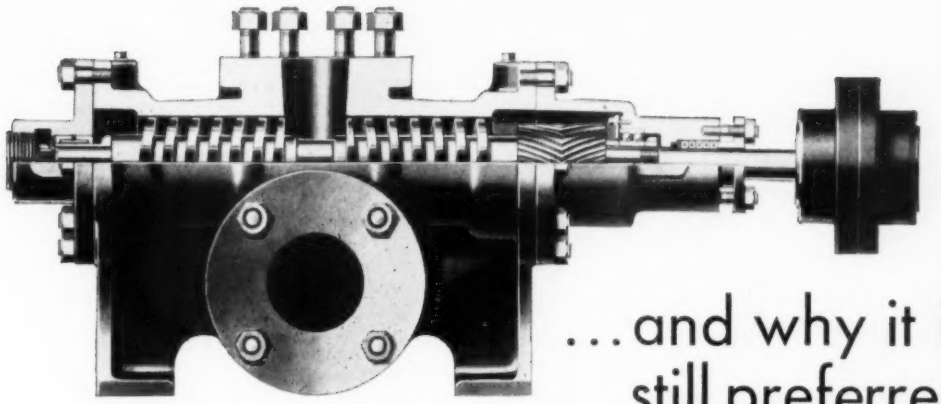
**SUCCESS THROUGH WELDING. Size 11 by 8½ in.; illustrated; 48 pp; paper bound. Published by the Lincoln Electric Company, 22801 St. Clair Ave., Cleveland 17, Ohio. Price 50 cents.**

SUCCESS STORIES of 25 men are presented in this booklet. Each is an account of how an individual with an idea has built a successful business. The stories all have in common the one fact that the arc welding process has been the foundation of the business described.

Nevertheless, the success achieved by these businesses is retold not to glorify an industrial process but rather to point out that today there still is opportunity in the American

# QUIMBY

## ...the Original Screw Pump



## ...and why it is still preferred

**100% Anti-friction bearing equipped.** Due to their rolling action and minimum lubricating requirements, anti-friction bearings maintain their original clearances without appreciable wear. No hydraulic shock or discharge pressure loads on the bearings because Warren-Quimby Screw Pumps are 100% balanced axially.

**Quadruple non-slip screws.** A specially generated curvature is now used, producing a straight line contour between screws, essentially eliminating all slippage between these elements. Closer clearances without metallic contact insure higher efficiencies over longer periods.

**Balanced power, pulseless discharge.** No special foundations or bolting required for successful operation. Smooth running and quiet, with a minimum of churning or foaming of liquid handled.

**No stuffing box troubles.** In general, there are no packing troubles with Warren-Quimby Screw Pumps. By using sets of opposed intermeshing pumping screws, the flow of liquid is from each end toward the center, insuring suction pressure only on the stuffing boxes.

**Herringbone Driving Gears.** Smoother flow of power from the driving shaft to the idler shaft is accomplished by multi-tooth, precision cut, full herringbone gears. These gears are so positioned and timed as to maintain a definite clearance between the pumping screw elements.

**Positioning Bearing.** A fixed ball or roller bearing on the drive shaft effectively absorbs all external thrust loads. This permits full floating screw elements, free to expand at elevated temperatures without harm to the pump.

**Interchangeability.** All parts, excepting the body and length of screws and shafts, are interchangeable with corresponding sizes in the gear-in-head and external bearing designs.

*The most complete line of Screw Pumps in the industry.*

**Insist upon the original...now owned, manufactured, marketed, serviced and guaranteed by Warren . . . one of America's pioneers of the pump industry. Write for bulletin S-204.**

PQ-3

WARREN QUIMBY PUMPS

# WARREN PUMPS

**WARREN STEAM PUMP COMPANY, INC., WARREN, MASSACHUSETTS**

**For more facts circle 599 on Reply Card**

# 4000
## Cu. Ft. Digester...
### One of Four at New Kraft Mill

The sulphate digester shown in the above view is one of four that we recently built for the St. Regis Paper Company's new Kraft Mill at Eastport near Jacksonville, Florida. They are 12 ft. in diam., 46 ft. from flange to flange, and were installed to help produce pulp for 100,000 tons of paper annually. Operation of this new mill boosts the total output of the St. Regis Paper Company to around 560,000 tons of paper per year.

And this brings us to an important observation. Although pulping techniques vary somewhat from Florida to the Pacific Northwest . . . from Maine to the Carolinas . . . sulphate and sulphite digesters built by the Chicago Bridge & Iron Company are used everywhere.

In addition to digesters, we design, fabricate and erect cylindrical and spherical pressure vessels, flat bottom storage tanks, Marx Savealls, elevated water tanks or any other type of heavy steel plate structure to meet your paper mill needs. Write our nearest office for further information. There is no obligation on your part.

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tradition of free enterprise, that success comes through perseverance, ability, hard work and individual initiative in thought and action.

## Productivity from Three Angles

**MANAGEMENT REPORTS**, published by Research Division, California Personnel Management Association, 2180 Milvia Street, Berkeley 4, California. Price $1.00 per report.

How to Improve Productivity Through Better Selection, Report No. 147. This stenographic brief, presented by Robert N. McMurry, Partner, Robert N. McMurry and Co., enumerates six areas of personnel administration or management that are of importance in building and maintaining a work force that will improve productivity.

How We Doubled Productivity with Profit-Sharing, Report No. 149. Lucas S. Miel, President, Commercial Steel Treating Corp., in this stenographic brief, first defines profit-sharing and then tells how the company doubled productivity by its adoption.

Productivity in the Salaried Organization, Report No. 156. This report contains a stenographic brief by Merle C. Hale, Director, Salaried Personnel Activity, General Motors Corp. In this talk, he elaborates on two basic questions: 1. What is the role of the salaried organization in improving productivity? 2. What can we do to have the kind of salaried organization which will contribute most effectively to improving productivity?

## Treatise on Casting

**INVESTMENT CASTINGS** for Engineers. Size 9 by 6 in.; 477 pp including index; illustrated; 1952 edition. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. Price $10.00.

The study of actual processes have played an important part in the preparation of this work which is a comprehensive book on a relatively new industrial process. It helps fill a void of published material on this subject.

The book covers the limitations and advantages of investment castings. It tells what is being done commercially in regard to this method of casting. It considers the relationship between wax, plastic and mercury processes. Information that is reported to be offered for the first time in print is included in the book. This is material on the mechanics of the frozen mercury method.

The following are some of the informative sections in the book: History and description of investment castings; melting and casting methods; foundry finishing investment castings; design suggestions for investment castings; and master pattern and pattern die.

# Whether you want 1 or 1,000,000 gauges no maker's mark means more to you than USG

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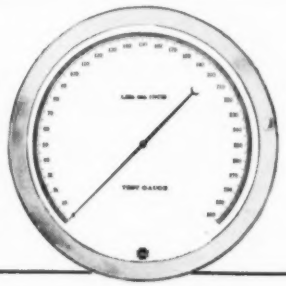
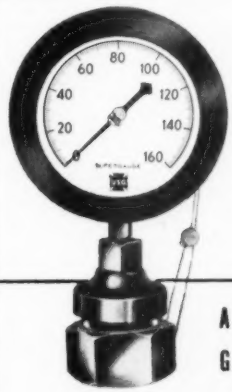
## 16" LABORATORY TEST GAUGE

Accuracy—½ of 1% of the indicated reading above 20% of the maximum dial range and 0.2% of full scale over balance. Furnished with Certified Test Report. Sensitivity as high as 1 part in 10,000. Ranges 15 to 20,000 p.s.i. standard; special 30,000 p.s.i. or over.






## CHEMICAL GAUGES

Cleanout and protected types. Cleanout type used for viscous liquids requiring periodic cleaning; protected type designed for low-viscosity liquids. These gauges are rugged, will stand high overpressure. Ranges 30" vacuum to 1500 p.s.i.

## HIGH PRESSURE SOLID FRONT GAUGES

For testing high pressure gases and liquids. Built to highest possible standards. Accuracy 1% of full scale reading up to 50,000 p.s.i., 2% of full scale reading on pressures over 60,000 p.s.i. Ranges 100 to 150,000 p.s.i.

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A highly accurate, dependable instrument for measuring absolute pressures. Ranges: 0 to 20 millimeters to 10 to 100 inches of mercury.

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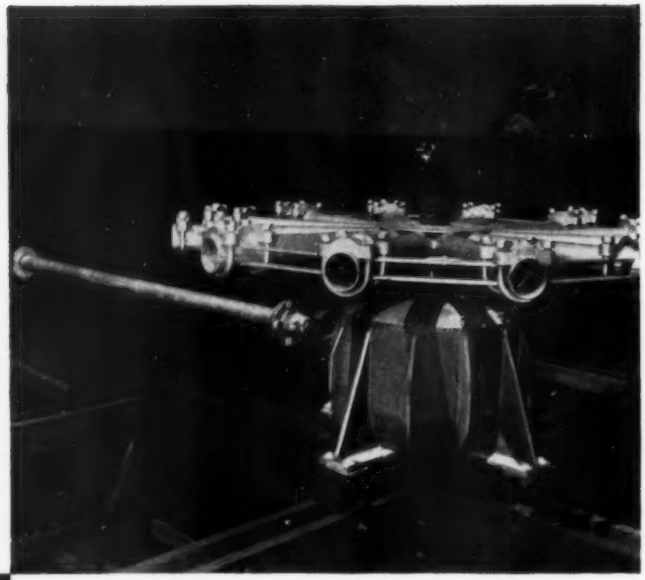
# MARLEY Mechanical Equipment is POWERED for PERFORMANCE



**Driving the large fans of modern cooling towers is a rugged job . . . one that demands power transmission equipment designed with an extra measure of sturdiness. With its added strength it must also be precision built for long, smooth service. That's why Marley designs and manufactures every element of the mechanical equipment for Marley cooling towers. The result is specialized equipment for a specific service.**

### MARLEY GEAREDUCER*

An exclusive Marley design utilizing hardened alloy steel gears, tapered roller bearings and heavy, carefully machined shafts—all in an extra strong, well sealed, cast iron case. Lubrication to every point is constant and flow is maintained whether operation is forward or reverse.

### MARLEY TWINFLEX* DRIVE SHAFT

This accurately balanced assembly is constructed of heavy steel tubing zinc-coated and sealed against internal corrosion by welded flanges. It transmits power to the cast steel yoke through pre-moulded neoprene inserts bonded to cadmium plated steel cores. They have excess load capacity that easily absorbs starting shock and transmits power smoothly.

### MARLEY FAN HUB

This hub for largest fans is of all-steel construction. Hub spokes are seamless steel tube; center hub and clamps are steel castings. It is precision welded throughout for great strength. After fabrication, the hub is hot dip galvanized. The design provides quick adjustment for fan pitch and uses a retention pin for added safety.

*Any Cooling Tower May Be Modernized with Marley Mechanical Equipment*

**The Marley Company**

Kansas City, Missouri

MARLEY

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(Continued from page 36)

articles which can be loaded onto a pallet or skid for power truck transportation. Gives handling tips for receiving material in boxes, transporting "boxed" material through processing, and shipping material in boxes. Elwell-Parker Electric Co.

**133 Sit-Down Truck**—Specifications, design and construction features of company's new 4000-lb capacity sit-down truck are given in 6-pp Bulletin 490. Data on performance, speed, weight, electrical and mechanical features, lubrication and safety devices are included, and line drawings give over-all dimensions. Mercury Mfg. Co.

**134 Slings for Industry**—Form 3303 is a compact reference bulletin packed full of sling data. Lists slings at approximate breaking strengths of 1000 lb to 249.4 tons, along with their safe loads for various angles of use. Three body styles are explained, assemblies shown. Macwhyte Co.

**135 Magnets for the Big Lifts**—Eight-pp Bulletin 112 describes lifting, separating and road-sweeping magnets and is illustrated with cutaways, photos and application shots. Also gives magnet weights and lifting capacities for standard bolted, welded and basket type magnets. The Ohio Electric Mfg. Co.

**136 Jacks and Pullers**—Catalog 53, 24 pp, on mechanical and hydraulic jacks, hydraulic pullers and special purpose jacks is generously illustrated and indexed for easy reference. Provides application information, specifications and a listing of accessories and attachments. Among equipment listed is the Simplex Re-Mo-Trol, a remote controlled hydraulic jack with new safety features. Templeton, Kenly and Co.

**137 Meet the Heavyweights**—This 8-pp catalog presents company's heavy-duty self-propelled wheel-mounted cranes. Pictures cranes in use, stresses their advantages, money-saving features. Includes specifications, operating data, and lifting capacities. Wayne Crane Div., American Steel Dredge Co., Inc.

**138 Hard-Working Tractor**—Bulletin TD-216 is a 28-pp booklet describing and picturing the Tournatractor, a high-speed, electrical control, rubber-tired tractor available with 10 interchangeable attachments. Action shots and photos of integral parts of the machine show how and why it gets more work done, reduces maintenance. R. G. LeTourneau, Inc.

## HEATING, COOLING

**139 Combination-Fired Heaters**—Bulletin 560-52 explains how combination oil- and gas-fired industrial space heaters were used for comfort heating and also to supply heat for process drying of vitreous ware. Tells how these heaters doubled a plant's output by decreasing drying time of castings and molds. Dravo Corp.

**140 Unit Heaters**—Sixteen-pp Catalog 403 contains description, photos, applications, specifications and optional features of a line of centrifugal fan type unit heaters. Diagrams of typical mounting arrangements show many ways these heaters can be used. Tables and charts give capacities. Airtherm Mfg. Co.

**141 Wall Radiation**—Catalog WR-C3, 12-pp, gives application and engineering data, specifications and dimensions on a line of wall radiation. Among new features stressed is interlocking fin design to assure permanent metal-to-metal contact between prime and extended surface. Fedders-Quigan Corp.

**142 Vinyl Report**—Here's a 6-pp article on the high speed fusing, embossed and laminating of vinyl materials by far-infrared electric heat. Tells how cast vinyl can be fused in 10 sec at belt speeds to 100 yd per minute. Cites applications showing how company's Chromalox radiant heaters help save factory space and increase production with minimum investment. Edwin L. Wiegand Co.

**143 Condensers, Heaters, Coolers**—Bulletin 800 introduces three all-purpose smaller size condensers, heaters and coolers for chemicals, gases, solvents, acids, caustics, and oil solutions as well as for refining, processing, and blow down applications. Manning & Lewis Engineering Co.

**THIS MONTH'S LITERATURE OF MERIT covers sound signals . . . fork lift trucks . . . hose care . . . welding electrodes . . . industrial ventilating**

**144 How to Use Sound Signals**—This new 44-pp combination manual, data book and catalog is an excellent reference work on industrial sound signals. Includes a simplified explanation of fundamentals of sound; a glossary of sound and signal terminology; a quick-comparison guide for selecting equipment; suggested steps in choosing a signal installation, and hints for compiling a coding signal call system. One section of the book lists manufacturer's signal equipment, and includes construction features, typical applications, dimensions, decibel output at various distances. Benjamin Electric Mfg. Co.

**145 Put Yourself in the Driver's Seat**—Unusually well organized and well illustrated, 36-pp Bulletin 1462 introduces company's FT Series fork lift, available in 26 models of 3000- to 7500-lb load capacities, diesel or gasoline powered. In logical steps, shows how easily the truck is mounted, started, driven and turned, and how the lift mechanism works. Stresses easy servicing, safety, maneuverability of truck, explaining design features contributing to these advantages. Engines, automotive type frame, hydraulic system, carriage are shown. The Buda Co.

**146 Tips on Hose Care**—This illustrated bulletin tells what to do and what not to do in the use and storage of various kinds of hose, including steam, fire, oil, gasoline, water, air, suction and sandblast. Also includes installation "do's and don'ts" and tips on making a static bond. Hewitt Rubber Division, Hewitt-Robins Inc.

**147 Booklet on Electrodes**—Form ADC 650 is a 50-pp pocket guide to company's electrodes. Over 30 of them—stainless, mild and high tensile steels, cast iron, non-ferrous, low hydrogen, and hardfacing—are described as to chemical analysis, procedure for welding and application. Other sections of this illustrated handbook are devoted to selection suggestions, mechanical properties and testing of electrodes and specifications. Air Reduction Sales Co.

**148 Industrial Ventilation Guide**—Bulletin 1520, 28 pp, presents ventilating problems peculiar to industry and shows some of the ways in which company's equipment is solving those problems. They cover general ventilation, heat and steam exhaust, smoke and fume exhaust, air circulation, equipment cooling, dust removal, air filtering, heating. Includes data on air change requirements, information on fan selection, and location use of ducts with propeller fans, other helpful data. Ilg Electric Ventilating Co.

July, 1953

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Use this space to ask for tear sheets, other information wanted.

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## CONSTRUCTION AND MAINTENANCE

**149** **Safety Plate**—This 12-pp illustrated booklet presents advantages and applications of a tough, rolled steel floor plate with raised lug pattern. Installation photos show how it meets requirements of safety, cleanliness, ease of maintenance, easy application. Fabricating information is provided along with safe load figures and illustrations showing its use on hatch covers, over wood sub-floor, over concrete, and spot-welded to steel joists. Inland Steel Co.

**150** **To Modernize Worn Floors**—Bulletin H-1, 8 pp, describes the replacement of worn floors with company's Sani-Brick floors, showing how surfacing can be done without interrupting production. Gives advantages of brick flooring, pictures many installations covering a wide range of processing industries, bakeries, storage plants. Drehmann Paving & Flooring Co.

**151** **Floor Patching Chart**—This handy chart uses pictures to show the various operations in the installation of Master-quick iron-aggregate floor patches. Includes directions on how to produce a patch having a strong feather-edge without chipping and square cutting; how to prepare a bond coat without using a separate material; how to produce a dense patch. The Master Builders Co.

**152** **Insulation Surfacing Specifications**—Specifications for the protective surfacing of high-, low-, or dual-temperature insulations exposed to normal, chemical and physical abuse, indoors or outdoors, are available. A handy index shows company's specifications applicable to each insulation surfacing problem and each insulating material. Benjamin Foster Co.

**153** **Concrete Gunning Equipment**—Form 583 fully describes two new models of company's Bondactors. Contains a detailed explanation of the "gunned" or "air placed" concrete and aggregate principle. Application photos show the equipment in use. Suggested uses in construction, repair and maintenance work are listed. Air Placement Equipment Co.

## METALS, AND METAL FINISHING

**154** **Barrel Finishing Manual**—Here's a 16-pp booklet on company's Honite barrel finishing method, a low pressure, random honing process for deburring and burnishing small metal parts. Tells how to choose proper size chips for specific operations and how to select correct finishing compounds for each. Ten compounds are described along with their characteristics, metals for which they are recommended, and prescribed mixtures. Minnesota Mining & Mfg. Co.

**155** **Industrial Castings**—Meehanite castings are described in this 8-pp booklet. Gives characteristics of the material, lists properties and carries engineering information on hardenability, section strength and comparative properties of other cast metals. Typical applications are pictured and table of standard bar stock sizes is included. American Brake Shoe Co.

**157** **Metal Surface Treatment**—This 16-pp booklet describes the Electrolizing process, surface treatment for providing wear-, abrasion-, and corrosion-resistance to ferrous and non-ferrous metals. Booklet lists applications in many industries in which machine parts and cutting tools may be treated by this process. The Electrolizing Corp.

**158** **Plating Waste Treatment**—Bulletin 3865 is an 8-pp article giving information on newer applications of the use of ion exchangers in the treatment of electroplating rinse waters, including the recovery of cyanide from cyanide plating rinse baths. The Permutit Co.

## X-RAY EQUIPMENT

**159** **Industrial X-Ray Equipment**—A buying guide for a complete and diversified line of accessories and supplies required for industrial X-ray installations is provided in 44-pp Catalog 404-000. Divided into four basic categories, covers films and chemicals, radiographic accessories, darkroom accessories, and viewing and filing equipment. Available to qualified plant engineers, please state your job title. Westinghouse Electric Corp.

**160** **X-Ray Analysis**—"Twenty Questions and Answers on X-Ray Analysis" is an 8-pp booklet prepared to clear up some misunderstandings concerning the difference in X-ray powder camera, spectrometer and spectograph equipment and techniques. Research & Control Instruments Div., North American Phillips Co., Inc.

## WATER CONDITIONING

**162** **Zeolite Water Softeners**—Twelve-pp Bulletin WC-108 covers the principles and details of zeolite water softening. Explains distinction between the sodium cycle and the hydrogen cycle of zeolite softening and shows differences in results obtained by the two processes. Describes design and operation of equipment used in zeolite water softening and available methods for controlling various operations in the softening and regenerating processes. Discusses modern ion exchange materials. Graver Water Conditioning Co.

**163** **To Clean Softeners**—Zeotone, a preparation for cleaning and toning up salt-regenerated water softeners, is described in this folder. Stresses advantages of the preparation; tells when and how to use it, giving step-by-step directions for cleaning both heavily-fouled units and those not badly fouled. Calgon, Inc.

## WELDING, MACHINE SHOP EQUIPMENT

**165** **Hints on Welding**—What you need to know to apply any of 11 alloys, including silver solder and their companion fluxes, etc. is told in this folder, Form 3453. Condenses technical instruction into lay language—it's easy to read, easy to follow. All-State Welding Alloys Co., Inc.

**166** **Gear Grinder**—Catalog GG-33, 8 pp, describes and illustrates a reciprocating gear grinding machine designed for the production of precision ground helical and spur gears. Explains grinding operation, discusses the wheel and dressing units, other construction features, and includes specifications. The Sheffield Corp.

**167** **Rosin Core Solder**—Bulletin 158 describes a new rosin core solder, RTS 200, available in a wide variety of sizes, compositions and quantities. Discusses greater spread, faster oxide penetration, other advantages over many rosin core solders. Federated Metals Div., American Smelting and Refining Co.

**168** **Sheet Floaters**—Bulletin SF-53 describes and pictures a device which automatically separates stacked steel sheets


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and blanks without air electricity or tools —it works by means of Alnico V magnets. Its operation is explained and typical separations obtained on various sheets are charted. Standard, medium-, heavy- and special heavy-duty models are pictured; sizes and prices given. Bulletin stresses advantages in speeding up the feeding steel sheets to presses, brakes, shears. Verson Allsteel Press Co.

## OTHER EQUIPMENT

**169 Hydro-Pneumatic Accumulators**—Bulletin 301, 12 pp, explains the function, construction and operation of company's hydro-pneumatic accumulators, giving size and pressure data. Tells how to choose an accumulator with Boyle's law. Use of accumulators as an auxiliary source of power for intermittent duty systems, for leakage compensation, for operating secondary circuits, as an emergency source of power and other applications are discussed and illustrated. Greer Hydraulics Inc.

**170 Synclinal Filters**—Incorporated in 12-pp Catalog 106 is latest information and improvements in company's synclinal filters for hydraulic oils, coolants and lubricants. Cutaway drawings, parts lists, dimensional charts, engineering data are provided, along with illustrations of actual mesh sizes. Marvel Engineering Co.

**171 Where Vibration Figures**—This bulletin describes Vibra-Sorbers, designed to isolate vibration from connecting suction and discharge lines to refrigerations and air conditioning machinery, pumps and turbines. Illustrated; gives specifications, installation instructions. Flexonics Corp.

**172 Synchronized Material-Production Control**—Booklet KD 259, 6 pp, describes a combination of tabulating procedures and Kardex visible systems intended to shorten the production planning cycle by getting firm schedules into the plant faster and eliminating the cause of certain production line delays. Remington Rand Inc.

**173 Pocket Conversion Table**—This little plastic card is imprinted with frequently-used altitude and refrigeration conversion tables. Includes a table converting altitude to pressure in inches of mercury, psi, and millimeters of mercury. The reverse side shows pressures of Freon 13, 22, 12 and 14 over a wide range of temperatures. Tenney Engineering, Inc.

**174 Wire Thread Inserts**—Bulletin 652, 22 pp, describes the uses of wire screw thread inserts in design, production salvage and maintenance. Introduces new specifications for inserts covering Class 2, 2B, 3 and 3B fits and explains how to achieve manufacturing economies through proper selection of fits. Text and illustrations show wire screw thread insert use in all materials. Heli-Coil Corp.

**175 Vacuum Still**—A vacuum still offering automatic control of heat, automatic solvent flow and automatic cooling water flow is described and pictured in Form 487. Stresses economy and other advantages, lists capacities. Butler Mfg. Co.

**176 Remote Control of Valves**—Sixteen-pp Bulletin 528 gives valuable information for selecting the correct size flexible shaft for the remote control of any valve, illustrating typical connections. Stresses advantages of flexible shafting, gives installation tips, design data. Stow Mfg. Co.

**177 Inter-Com System**—Bulletin 28 describes and pictures the Femco Pagephone system which provides clear speech over telephone-type handsets, plus an all-hear paging feature utilizing a loudspeaker. Stresses economy of the system which uses one central amplifier, one common cable and requires no operator. Farmers Engineering & Mfg. Co.

**178 Balanced Industrial Ventilation**—The scope of Bulletin 115 is limited to problems resulting from the relationship of exhaust and make-up air systems, and the bearing it has on the heating load. Discusses problem created by exhaust system and presents a solution. National Association of Fan Manufacturers, Inc.

# DATA FILE of literature for the plant library

**STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided on pages 35-36 and 157-158.**

## MECHANICAL POWER TRANSMISSION

**201 Variable Speed Control Simplified**—Bulletin 700 contains some 40 pp of descriptive, application and engineering data on variable speed pulleys and selective speed transmissions. Illustrations show how old and new machines can be equipped with efficient variable speed control. Lovejoy Flexible Coupling Co.

**202 Improved V-Belts**—This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

**203 Power Drive Handbook**—Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.

**204 Belts to Suit the Job**—This bulletin presents company's "inner-locked" woven duck belting available in types for general elevating and conveying and general power transmission applications as well as special jobs. Imperial Belting Co.

**205 Manual on Power Transmission Machinery**—Containing 225 pp of data, this illustrated handbook covers roller bearings, V-belt drives, friction clutches, couplings, collars, sleeve bearings, pulleys, take-ups and hangers. Provides engineering data, formulas. Dodge Mfg. Corp.

**206 Shaft Collars**—Steel shaft collars in 42 standard sizes for shafts from 3/16 to 3 in. dia are presented in this bulletin. Shows the collar in use on various types of machinery. Standard Pressed Steel Co.

**207 Oilless Bearings for Conveyors**—Technical Catalog 210, 20 pp, gives detailed information for specifying, installing and use of bearings for screw and roller conveyors, together with operating characteristics. The sectionalized catalog provides tabular data and dimensional drawings to facilitate identification of bearings for replacement. Arguto Oilless Bearing Co.

**208 Coupling or Converter**—To promote a better understanding of hydraulic couplings and torque converters, this 32-pp publication tells where couplings or torque converters should be used, and why, furnishing a source of facts on non-technical terminology. Covers meaning and characteristics of torque and effect on driving and driven equipment. Twin Disc Clutch Co.

**209 Roller Chains and Sprockets**—Bulletin 52-1 is a 54-pp ordering book describing inherent advantages of roller chain and presenting all popular sizes of company's Baldwin-Rex roller chains. Gives excellent information on selection of standard drives, including engineering formulas and tables. Dimensions, strengths, weights and prices are included. Book also deals with sprockets, their characteristics and prices. Baldwin-Duckworth Div., Chain Belt Co.

## VALVES, TRAPS, PIPING AND ACCESSORIES

**210 Valves and Fittings**—Illustrated Catalog 47 provides over 60-pp of ordering information and application data on valves and fittings made of stainless steel and other corrosion resistant alloys designed for use where corrosion or contamination are factors. Gate, globe, and angle valves for a wide range of services are presented, also needle valves, sampling valves, screwed and flanged fittings. Design and construction details are shown. Also included is a chart of first and second recommendations of alloys for corrosive media. Alloy Steel Products Co., Inc.

**211 For Quick Valve Selection**—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated and thumb-indexed, includes pressure-temperature chart. The Ohio Injector Co.

**212 Valve Maintenance Guide**—"Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented. Discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

**213 Automatic Valves**—Pressure, flow, and liquid level controls for steam, air, gas and fluids are shown in 90-pp Catalog A-50. Includes sizes, prices, capacity charts, conversion tables. Davis Regulator Co.

**214 Valves for Processing**—General Catalog 1500 B, 20 pp, describes in detail the operation and performance of all of company's single seated valves—the Domotor, electo-pneumatic, handwheel and combination models. Optional assemblies for specialized applications are shown. Application information, operating characteristics given. The Annin Co.

**215 Efficient Flow Control**—Data on bronze, iron, steel and corrosion-resisting valves in a wide range of types, for oil, water, gas and low pressure steam. Shows how valves are designed for service, low maintenance. The Wm. Powell Co.

**216 Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions and specifications. Walworth Co.

**217 Reducing Valve Engineering Data**—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straight-line flow, tight closing. A. W. Cash Co.

**218 Steam Trap Reference Manual**—Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure trap sizes and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

**219 Steam Trap Book**—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all classes of equipment; a maintenance section. Armstrong Machine Works.

**220 Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb; separators. W. H. Nicholson & Co.

# DATA FILE

(Begins on page 159)

**221 Welding Fittings**—Catalog 3 is a 36-pp ordering and engineering reference book on company's Weldolets for piping services. Gives data on butt-welding and socket welding Weldolets as well as on Thredolets for making threaded outlets. Typical installations are pictured; sizes, weights and prices provided. Also included are installation instructions and a technical section covering material specifications. Bonney Forge & Tool Works.

**222 Design Properties of Pipe**—This 12-pp booklet consists of tables listing pipe sizes and wall thicknesses currently established as standard, plus what is believed to be the most nearly complete tabulation ever published of dimensional properties of commercial steel pipe. Tube Turns, Inc.

**223 Steam Hook-ups**—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculators, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.

**224 Handbook on Fittings, Flanges**—Catalog wf-1950, 68 pp, offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure ratings, physical and chemical requirements. Grinnell Co., Inc.

**225 Packless Expansion Joints**—Bulletin 35-51A offers 28 pp of up-to-date information on company's Corruflex joints, their design and installation and advantages over other means of providing for thermal expansion in pipelines. Construction features are explained and illustrated; simplified selection data include tables for determining amount of expansion in pipelines. American District Steam Co., Inc.

Whether heavy-duty or light-duty, high-speed or low-speed, from oil burners and blowers to pumps and agitators, there is a LOVEJOY Flexible Coupling to meet your exact requirements. They offer the best obtainable insurance against alignment troubles —dampen and absorb starting torque, vibration and shock of intermittent loads . . . protect motor and driven machine . . . lengthen bearing life.

LOVEJOY Flexible Couplings are compact in construction, durable and provide excellent resiliency. Bodies carefully machined. Cushions available in materials suited to the particular load conditions . . . can be changed without shutdown. No lubrication needed.

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**226 Piping Pointers**—This is company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co.

**227 To Stop Those Leaks**—Catalog 41-0 offers 28 pp of helpful ordering and application data on pipe repair clamps and saddles, valve and bibb reseaters. Illustrates each product, tells where to use it and how to install it, giving dimensions and prices. M. B. Skinner Co.

## ELECTRICAL

**228 Motor-Generator Reference Book**—Publication 51R7933 is a 50-pp booklet compiled to assist in the selection of motive power to handle most industrial applications. Neither text book nor ordering catalog, this book provides a brief outline of the various types of motors, generators and motor-generator sets, telling their applications and operating requirements. Booklet is generously illustrated and includes performance data, ratings, information on methods of speed control, general characteristics. Allis-Chalmers Mfg. Co.

**229 Industrial Motors**—Twelve-pp Brochure 100 gives information on company's line of industrial motors. Construction details are discussed and drip-proof, splash-proof, totally enclosed and other types described and illustrated. Mechanical and electrical modifications possible are detailed and selection data included. Motor generator sets, brake motors, elevator hoist motors are shown. Electro Dynamics Div., General Dynamics Corp.

**230 Motor Handbook**—Bulletin MU-185 provides 66 pp of engineering and descriptive data on motors, covering splash-proof and explosion-proof types, gear motors, motors for use in chemical plants, for oil well pumping, punch presses, elevators, cranes and hoists. Wagner Electric Corp.

**231 Motor Panorama**—Motors and generators—about 50 types in all—are pictured in Publication AEB 100.8B, which serves as a handy reference, since it lists specific literature dealing with each motor shown. Gives general construction details of each unit. Fairbanks, Morse & Co.

**232 Motor Controls**—In this 28-pp bulletin the most important items in company's line of standard motor control apparatus for all industries are presented. Controls, starters and accessories are described and applications listed. Allen-Bradley Co.

**233 The Answers on Wiring**—"20 Questions and 20 Answers on Safety m.i. Wiring" describes and illustrates characteristics and advantages of this new wiring system. A complete table of types, sizes, weights and lengths, as well as a partial list of users included. General Cable Corp.

**234 Bus Duct Manual**—Booklet B-4272A, 68 pp, on bus duct and accessories, presents application and test data, specifications, information on pricing a typical installation. Describes advantages of bus duct for a secondary power distribution system, carrying current from transformers to switchgear—and from there to motors, etc. Westinghouse Electric Corp.

**235 Plug-In Power**—Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Feedrail Corp.

**236 Power Distribution Feeders**—Catalog TEB-1, 40 pp, on heavy-duty units for main feeders in distribution systems, gives construction, engineering, application data. Trumbull Dept., General Electric Co.

**237 Power and Control Cables**—Sixty-pp Catalog 24 describes typical power and

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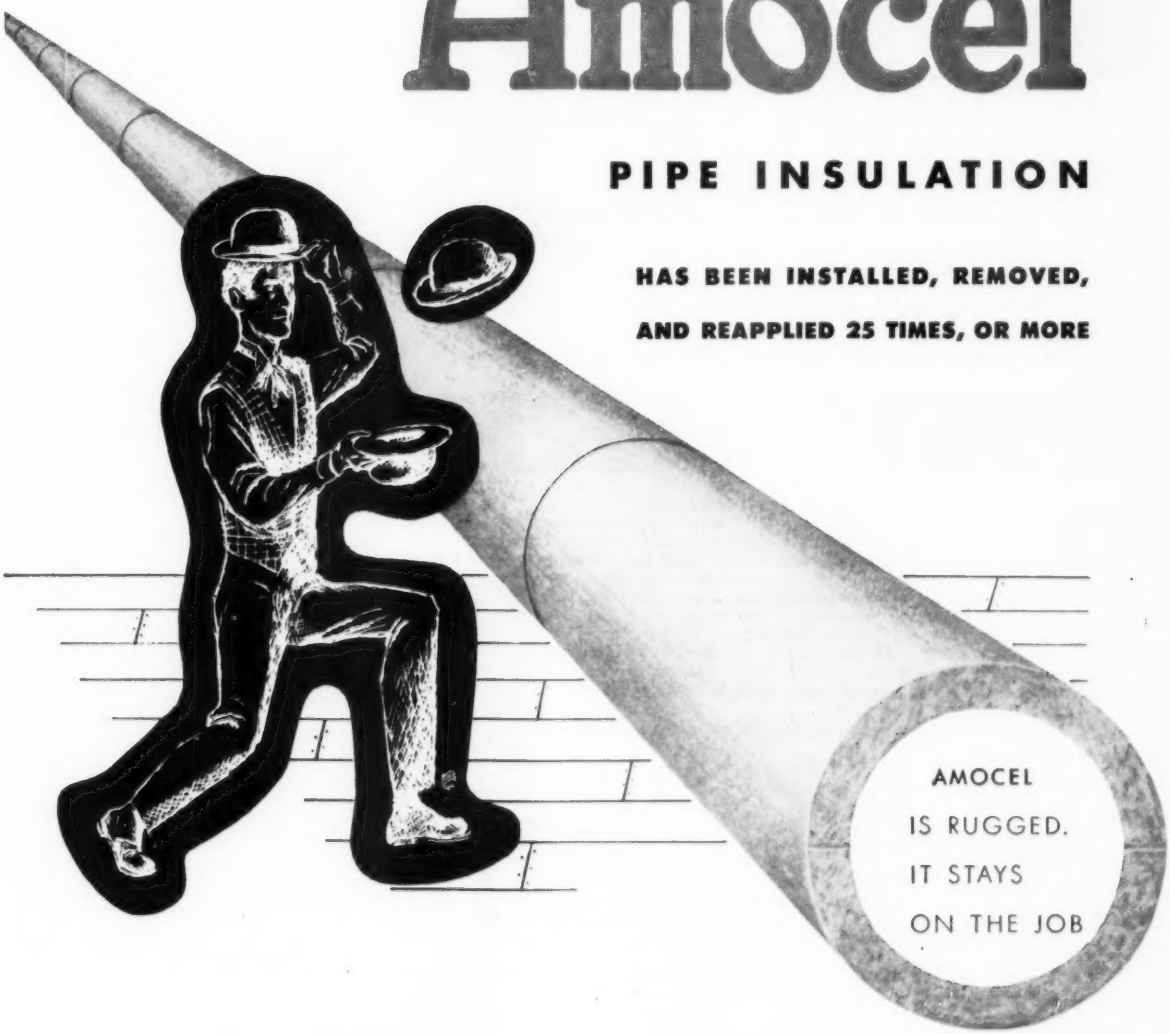


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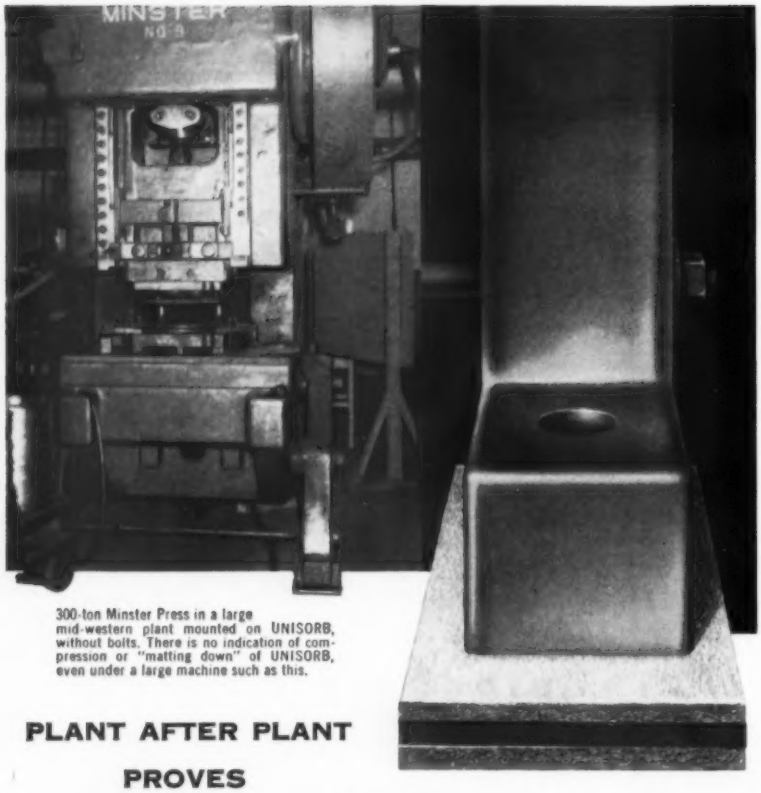


300-ton Minster Press in a large mid-western plant mounted on UNISORB, without bolts. There is no indication of compression or "matting down" of UNISORB, even under a large machine such as this.

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# UNISORB®

In addition to reducing transmitted machine noise and vibration up to 85%, UNISORB saves you time and money on installation.

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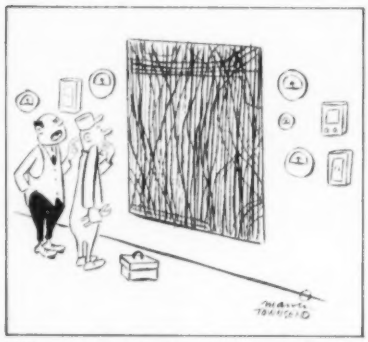
# DATA FILE

(Begins on page 159)

control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

**238 Power Distribution Practices**—The 28-pp "Industrial Power Distribution Idea Book" (Bulletin GEA-5900) is a guide for plant engineers on electric power distribution practices in large and small plants. Covers utility distribution practices; methods of buying power; what to do when a choice of primary voltages is available; application of primary switches and circuit breakers; types and arrangements of primary cables; and types of load-center distribution systems. Also discusses branch feeder switches, starters, and fuses, grounding of systems, interrupting capacity. General Electric Co.



"Come, come, Sweeney. I'm only asking you to repair one tiny little wire."

**239 Batteries for Lift Trucks**—Bul'etin IT-517 explains why company's Slyver-Clad batteries are designed to give longer and more efficient service and cost less to operate. C & D Batteries, Inc.

**240 Battery Technology Handbook**—This is a 56-pp revised edition of company's manual of technical instruction and engineering data on the care of motive power storage batteries. Major addition is a section on charging, which includes information on modified constant voltage and two-rate charging, boost, equalizing and emerging charging, control of discharge, etc. Other sections cover the theory of the lead-acid battery; practical tips on care and operation; maintenance and repair. Gould-National Batteries, Inc.

**241 Power Circuit Transformers**—By means of comparative wiring diagrams, 12-pp Bulletin 501-15 demonstrates the economy and system simplicity afforded through the use of company's power circuit transformers in handling lighting and low voltage features of these dry type transformers, their use in converting old installations, isolating service. Jefferson Electric Co.

**242 What You Should Know About Circuit Breakers**—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, inrush current effects, tripping and reset time. Heinemann Electric Co.

**243 FHP Manual Starters**—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual. Lists applications for these starters and pictures enclosures. Square D Co.

**244 Circuit Breaker Reference Data**—Catalog Section 5000 is a collection of more

ACTUAL SIZE

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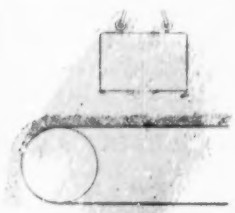
it's a hunk of iron that found its way into a coal pulverizer in a Wisconsin plant. Its scarred surface tells a sad story about that pulverizer and its unhappy owners, who've learned how economical an investment a magnet can be . . . the hard way.

Any plant that doesn't have a magnet to protect processing machinery ought to compare the cost of tramp iron trouble with the cost of a magnet.

And if your old magnets aren't doing the job, learn about the new, improved types available. *Write Dings today for* CATALOG C-5000-B.

Dings Magnetic pulley installed as head drive pulley on conveyor belt. Iron separated, discharged automatically.



Dings Rectangular Suspended Magnets pull iron out of deepest burdens, fastest moving conveyor belts.

RS153

**Dings**

**MAGNETIC SEPARATOR COMPANY**

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# DATA FILE

(Begins on page 159)

than 30 data sheets providing selection and application information and ordering instructions for company's molded case circuit breakers. Fully illustrated, includes ratings, current carrying capacities, dimensions, prices. I-T-E Circuit Breaker Co.

**245 Preventive Maintenance Tips**—Booklet B-5477, 28 pp, discusses programs designed to reduce shut-down time on production lines and treats in detail the maintenance of power equipment. A suggested schedule of work and cleaning on power equipment is presented in chart form. Essential information on preventive maintenance for turbines, generators, switchboards, motors and controls is given. Westinghouse Electric Corp.

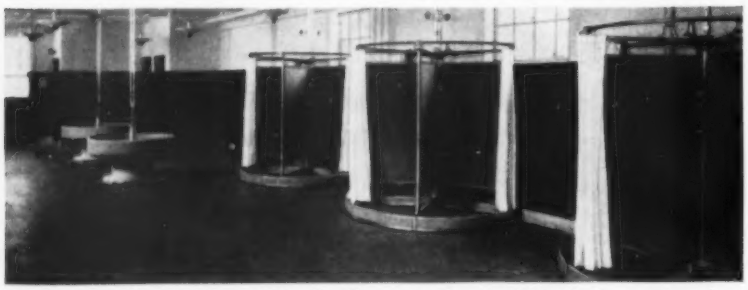
**246 Snap Action Switches**—Catalog 82, 23 pp, on precision snap-action switches, presents safety, limit, and interlock types designed especially for switching a-c circuits in industrial applications. Covers heavy-duty limit switches, metal enclosed switches, some of which are sealed against dirt, dust, splashing. Micro Div., Minneapolis-Honeywell Regulator Co.

**247 Electrical Equipment for Cranes**—A complete line of electrical equipment designed exclusively for crane service is presented in 32-pp Bulletin C5-1. Covers everything from company's a-c Magnetorque crane control to current collectors, and is generously illustrated. Overhead Crane Div., Harnischfeger Corp.

**248 Flexible Cords**—This well-illustrated 24-pp booklet includes all new Underwriters' classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives selection tips. Whitney Blake Co.

With Bradleys like this, washing time is reduced. (Pre-Cast Stone Model)

And women as well as men enjoy the sanitary features. (Stainless Steel Model)



Complete the washing facilities with Bradley Showers as shown at right side above and you have

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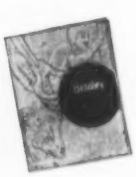
American industry has found that Bradley Washfountains and Showers provide the maximum capacity while making savings in space, water consumption, piping connections and maintenance. With foot-control Bradley Washfountains eliminate faucets, so hands touch nothing but the clean running water while up to 10 are accommodated simultaneously. The bowls are self-flushing to prevent collection of contaminating water.

Multi-Stall Showers are furnished in 5- and 3-Stall Units — shipped partially assembled for quick installation.

During over 30 years Bradleys have become recognized as the finest and most sanitary washing fixtures available, — an aid to better human relations. BRADLEY WASHFOUNTAIN CO., 2273 W. Michigan Street, Milwaukee 1, Wisconsin.



Complete Catalog 5204 mailed on request.

BRADLEY washfountains and showers

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## LIGHTING

**249 Plant Lighting Planning Guide**—This 32-pp handbook of industrial lighting presents economics of a plant lighting program in terms of lower production costs, reduced working time, less fatigue and eyestrain, less spoilage, fewer accidents, better morale. Explains six major steps in initiating, developing and carrying out a lighting program; tells how to select equipment and stresses importance of maintenance. Includes table of recommended levels of illumination for industrial interiors. Benjamin Electric Mfg. Co.

**250 Selection Data on Lighting Fixture Hangers**—Catalog 50, 80 pp, contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

**251 Lighting Fixtures**—Full information on company's fluorescent lighting fixtures designed for efficient industrial lighting and reduced maintenance is provided in Form OD-568. Day-Brite Lighting Inc.

## INSTRUMENTS, CONTROLS

**252 Wide Range Regulator**—Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.

**253 Gages for Many Jobs**—Sixty-eight pp of liberally illustrated information is offered in Catalog 64. Describes a variety of gage types; air volume controls for pump installations, vapor tension thermometers, d-c ammeters and voltmeters, and water flow meters covered. Includes engineering tables. United States Gauge Div., American Machine and Metals, Inc.

**254 For Liquids Worth Storing**—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

**255 Electrical Instruments**—A line of instruments for production testing, plant maintenance and service is shown in 16-pp Bulletin A-16-B. Among these are a-c clamp volt ammeters and a-c clamp ammeters, circuit testers, analyzers, mutual conductance tubechecker, pocket-size meters. Weston Electrical Instrument Corp.

**256 Handbook on Automatic Controls**—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature pressure-low water, liquid level, bottles; transformer-relays, valves. The Mercoid Corp.

**257 Industrial Controls**—Catalog 8305, 84 pp, describes and illustrates non-indicating electric, electronic and pneumatic controllers for temperature, pressure and humidity; also pneumatic and electric valves, switches and relays. Indexed and compiled for easy use, catalog provides specifications, dimension drawings, application data and ordering information. Industrial Div., Minneapolis-Honeywell Regulator Co.

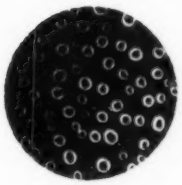
## MATERIALS HANDLING

**258 Data on Tramrail Equipment**—Twelve-pp Form 2008F is a well organized booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design, switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

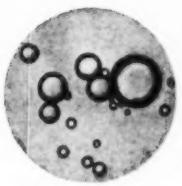
**259 Engineered Monorail Applications**—A file of application literature is announced as the beginning of a new service offered potential users of monorail equipment. Includes a technical booklet on automatic dispatch systems and an equipment bulletin in addition to several case studies of

RIGHT IN YOUR OWN BACK YARD...
BY WEST
BUGS KNOW IT'S THE KISS OF DEATH WHEN THE WEST MAN TURNS ON THE NEW ATOMIZER
A TWIST OF THE WRIST AND IN TWO MINUTES THIS PLANT WILL LOOK LIKE A LONDON FOG!
WOW! THIS JOB USED TO LOUSE UP THE WEEKEND FOR FIVE MEN. AT DOUBLE TIME!
WEST ATOMIZERS? WOW! WE'RE SITTING DUCKS IN THIS CRACK!
YOU'LL STILL SWING A MOP, THUNDERFOOT. THIS IS A BUG KILLER, NOT A JANITOR!
BET THIS BLOWS MY JOB RIGHT OUT THE WINDOW!
TRAPPED BY VAPOSECTOR! SAME DIRTY TACTICS THAT WIPED OUT OUR COUSINS AT THE CANNERY!
JIGS UP! IT'S THIS OR WEST FUMIGANTS OR WEST RESIDUALS!
WHAT STRATEGY! THEY'VE MAPPED OUT AN INSECT CONTROL PLAN THAT'S STOPPED US COLD!
HEY! WAIT A MINUTE... WHO'S GONNA CARRY US OUT?

# Fog 1,000 cu. ft. in 3 seconds for 5¢



**Top** — Magnified photo of uniform 8 micron droplets produced by precision-machined suction nozzles of West Atomizing equipment. "Dry mist" remains air-borne for prolonged periods.



**Bottom**—Magnified photo of droplets produced by ordinary hydraulic compressor sprayers. Vary from 2 to 300 microns. Larger droplets fall, wetting floors and reducing effectiveness.

– and with only 1 ounce of Vaposector – for complete control of flying insects. Double this dosage for crawling insects.

Impossible? Not with a permanently installed West Atomizer. 10 suction nozzles atomize a "dry mist" of extra-potent insecticide. Droplets are so small they hang in the air . . . seep into every crack . . . penetrate delicate insect breathing tubes.

It's an unbeatable combination. High potency Vaposector – sprayed with super-efficient West atomizing equipment. One man does the job. There's only one valve to open. You can fog your entire plant simultaneously.

West has a complete line of insecticides and atomizing equipment ranging from permanent installations to portables. A West specialist will be glad to make a survey and set up an Insect Control Program to fit your needs. Without obligation. Just mail the coupon.

WEST DISINFECTING Company

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**YES! Tell us about your Insect Control Plan**

☐ Please send me the West Insect Control Booklet

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# DATA FILE

(Begins on page 159)

installations. As they are completed new groups of case studies will be sent to holders of file. Available to qualified plant engineers. The American MonoRail Co.

**260 For Overhead Handling**—This 12-pp illustrated catalog covers motorized and hand operated cranes and monorails engineered for efficient, low-cost handling. Special construction features are detailed; accessory equipment shown. Abell-Howe Co.

**261 Handbook on Overhead Conveying Systems**—Manual A-56 provides 200 pp of information on overhead track systems and conveying equipment. Pictures installations, construction details; gives engineering data. Richards-Wilcox Mfg. Co.

**262 Materials Handling Equipment**—Illustrated Catalog P602 is a 44-pp guidebook on materials handling equipment for industrial plants. Subjects covered include description and application data on company's gas and electric fork lift trucks, motorized hand trucks, hand lift trucks and hand and electric hoists. The Yale & Towne Mfg. Co.

**263 Metal Conveyor Belts**—This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belts; covers raised edge and flight constructions, chain edge construction, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

**264 Cost-Cutting Conveyor Units**—Standardized gravity and power units covering a wide range of conveying jobs are described and pictured in Bulletin 63-C, 30 pp. Roller, wheel, and belt conveyors, elevating units, drives and accessories are presented, along with specifications. Practical in its approach, this book offers ideas for the use of these units. Standard Conveyor Co.

**265 Tubular Conveyors**—Form HC-541 contains about 44 pp of data on tubular conveyors for moving almost any flowable material. Shows basic types of these conveyors, tells what they're designed to do and how they are applied. Lists materials being handled to advantage with them, and discusses benefits. Gives engineering data. Hapman Conveyors, Inc.

**266 Safe Truck Operation**—"Safety Saves!" is a 24-pp booklet setting forth "do's" and "don'ts" established as a practical code of truck operation. The admonitions, pointed up by cartoons, serve as both "refresher course" and text. Industrial Truck Div., Clark Equipment Co.

**267 How to Pick a Truck**—Catalog 54, 8 pp, features a step-by-step procedure for making the best fork truck choice for a particular handling job. Other sections in the booklet show at a glance complete specifications on each of company's trucks, and illustrate important construction and design features. The Baker-Raulang Co.

**268 Industrial Truck Reference Guide**—Bulletin 300, 44 pp, covers company's line of current model tractors, trailers, fork lift trucks, platform lift trucks and load-carrying trucks. Major categories are: the trackless-train system; the fork-truck pallet system; and the lift truck-skid system. Each category is preceded by an analysis of applications and merits of the handling system. Mercury Mfg. Co.

**269 Stand-Up Fork Lifts** — Complete specifications are available on stand-up fork lift trucks in 2000- and 3500-lb capacities. These trucks feature easy maneuverability and manufacturer's Lev-R-Matic drive. Mobilift Corp.

**270 Industrial Logistics**—Form A-9516-4450 is a 12-pp booklet covering strategic handling of materials from raw state to distribution. Discusses master unit load and transportation cycle. Explains company's system of adapting all loads to four types of containers, assembling maximum numbers of these into master unit loads, and transporting them as single units. The Elwell-Parker Electric Co.

**271 Industrial Elevators**—Bulletin 5211, 32 pp, industrial elevators and portable cranes. Shows portable elevators in hand- and electrically-operated types in load capacities from 500 to 5000 lb. Also presents pallet elevators, barrel elevators, platform loading and balcony elevators, four-post elevators for heavy duty use and stationary elevators. Barrett-Cravens Co.

**272 How to Operate a Crane**—Booklet 920 is a 48-pp generously illustrated instruction book on crane operation, helpful to both beginner and seasoned operator. It shows hand signals, defines crane and hoist terminology. Covering all phases of crane operation, it discusses in detail the co-ordination of crane motions and includes safety rules and inspection, maintenance tips. Individual copies of this book are free to qualified plant engineers. The Electric Controller & Mfg. Co.

**273 Manual on Electric Hoists**—Catalog H-46, 44 pp, covers monorail and stationary hoists and car pullers. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

**274 Electric Hoist Manual**—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.

**275 Trolley Hoists**—Bulletin DH-269, 2 pp, describes and pictures ½ to 3 t ca-

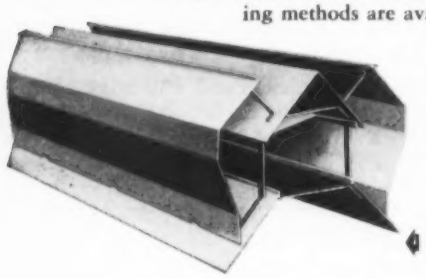

# Simple, practical ventilation
## for many kinds of buildings

## Swartwout-Dexter Heat Valve

**The *original* continuous ventilator**

The Heat Valve as developed and improved by Swartwout has proved to be one of the most adaptable ventilator designs. Originally applied principally to ridge peaks, its use on slopes or flat roof surfaces has become common. Popular uses in the smaller sizes include saw-tooth construction and skylights.

Heat Valve is designed for maximum capacity with lowest friction, and greatest assistance from outside air currents. It provides practically any area of roof opening desired, at economical cost. Can be quickly and easily installed. Always weatherproof, with fully adjustable damper for exhaust control when needed. Various damper operating methods are available.



Swartwout-Dexter Heat Valve is made in 10 throat sizes, in standard 10 ft. lengths. Can be made of special materials when acid or fume conditions prevail . . . Get the full story — write for Bulletin HV-D.

*Low overall height of Heat Valve enhances appearance — is an advantage structurally.*

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**Roof Ventilators and Ventilating Louvers**

POWER PLANT EQUIPMENT • PROCESS INDUSTRY CONTROLS

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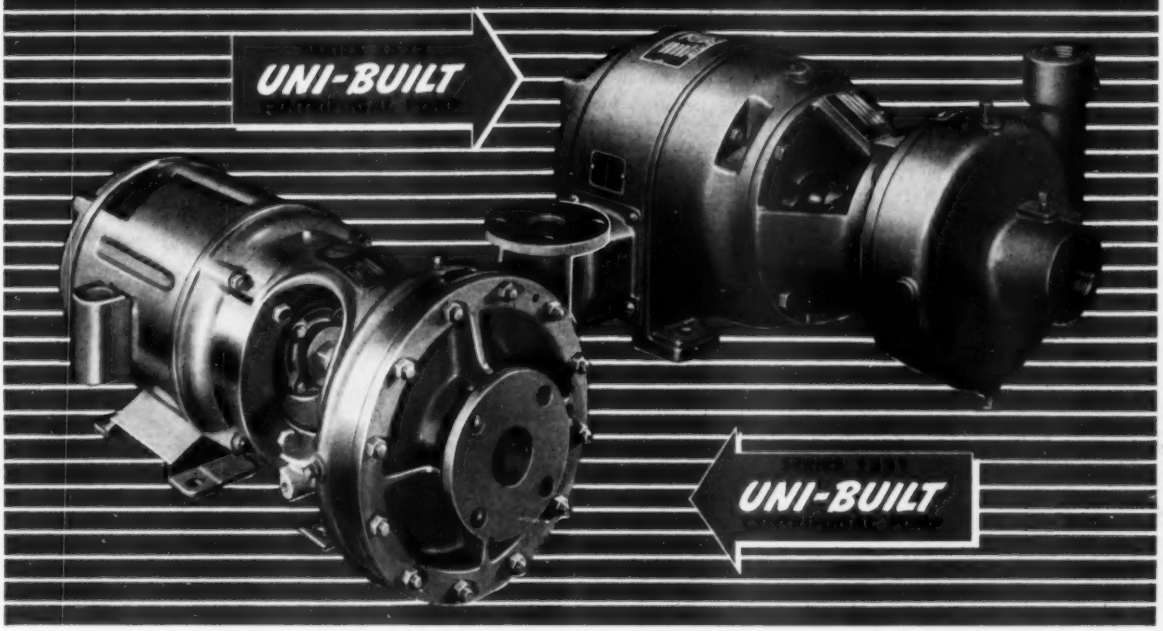
# *Popular sizes carried in stock!*



**Sizes, capacities and prices on B & G Series 1522 and 1531 Stock Pumps are given in a bulletin available upon request. Send today for your copy.**

**B & G manufactures a comprehensive line of Hydro-Flo Centrifugal Pumps and Heat Exchangers for industrial applications. Send for catalogs.**

These are *the* pumps which stand up under hard service in industrial plant applications! For your convenience, a stock of most commonly used sizes is maintained at the factory—ready for immediate shipment.

The leak-proof "Remite" Mechanical Seal alone makes these pumps a *buy!* This new-type Seal is harder than glass—wear-proof, corrosion-resistant. It's self-lubricating and eliminates the usual leakage through the packing gland—assures trouble-free operation.

**Smooth running . . . quiet!**

Oversize bearings hold the shaft in alignment for smooth, quiet performance...balancing of the impeller prevents shaft vibration and seal failure. All parts are machined to rigid specifications, carefully inspected and assembled—assurance of minimum installation and maintenance expense. B & G Series 1522 and 1531 Pumps kept in stock at the factory are bronze-fitted only, but are available as all-iron, all-bronze or stainless steel units.

With all these advantages, you'll find them competitively priced!

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LIKE AN
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EXPLOSION

Just 1/32" (pinhole size) faucet leak
MUSHROOMS into ATOMIC WASTE
of approximately 95,000 gallons • of water yearly—costing:
$24.14
@ $1.90 per M cubic feet

If a hot water faucet, then: (actual) FUEL WASTED heating 95,000 gallons costs approximately:
$88.91 if coal (9870 lbs.)†
$91.08 if oil (792 gals.)†
$84.41 if gas (84,411 cu. ft.)†
Above figures authenticated by Hackensack Water Co.* and American Gas Association.†

STOP this needless WASTE during today's MATERIAL and MANPOWER shortages with "SEXAUER" "Easy-Tite" that outwear ordinary faucet washers 6-to-1, thus SAVING labor on 5 REPEAT repairs, PLUS water and fuel, while prolonging the life of SCARCE fixtures.

PAT'D
"EASY-TITE"
FAUCET WASHERS

...a modern laboratory triumph, are compounded from du PONT NEOPRENE (tested up to 300°F.) instead of rubber—to withstand DESTRUCTIVE HEAT common in present-day superheating water systems—that formerly broke down washer's structure.

*Built like a tire with fabric re-inforcement* they resist the grinding, closing squeeze that SPLIT and MUSH ordinary washers out of shape...causing LEAKS.

Through combining NEOPRENE and FABRIC RE-INFORCEMENT they OUTWEAR ordinary washers 6-to-1 on hot or cold FAUCETS—thus you slash water, fuel and labor costs.

THE NEW 'SEXAUER' CATALOG

Edition G, just out, pictures over 2500 TRIPLE-WEAR plumbing REPAIR parts and Pat'd. Precision Tools. It's today's accepted buying guide for discriminating purchasing and maintenance personnel among thousands of top PLANTS, INSTITUTIONS and GOVT. AGENCIES that rely on SEXAUER repair materials. Send for your copy today!

Then too, there's a SEXAUER TECHNICIAN within quick call from coast-to-coast, who offers a special SURVEY service that sets up a schedule of the exact replacement parts required for your particular plumbing fixture regardless of make or age and *without obligation.*

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SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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# DATA FILE

(Begins on page 159)

pacity army-type trolley hoists, plain or geared, for use where a close headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.

**276 Shovel and Loader**—Described in 12-pp Bulletin 1932 is a hydraulic crown and hoist shovel and loader incorporating mechanical features usually associated with big shovels. Illustrates, gives specifications, application information on both pneumatic traction and crawler traction models. Dempster Bros., Inc.

**277 Trucks, Casters, Wheels**—Catalog 50, 65 pp, covers platform trucks, superstructures, two-wheel and pry trucks, dollies, trailers, casters, wheels, offering a wide range of chassis, superstructure and wheel combinations. Thomas Truck & Caster Co.

**278 Data on Truck Casters**—As much specific information as can be presented in a catalog for commercial usage is included in 105-pp Catalog 124 on truck casters. Besides specifications, ordering data and photos, this well-indexed book includes load capacity charts, defines caster terminology, tells how to select casters and install them. The Bassick Co.

**You may use the two Reader Service Cards to request information on ads, too. Just circle the key number appearing at bottom of the ad.**

**279 Industrial Lifts**—This booklet presents a wide range of elevating equipment designed to step up efficiency and cut handling costs. Covers dock lifts, crossover bridges, sidewalk elevators, truck service lifts. The Wayne Pump Co.

**280 Portable Hoists**—This bulletin describes a lightweight air hoist in 2000, 100, 500 and 300-lb capacities. Gives specifications, dimensions. Ke ler Tool Co.

**281 For Hopper Economy**—"In Dollars and Sense" explains long run economy of company's self-dumping hoppers, showing how they operate and telling how they fit particular plant requirements. Illustrated with photos, gives dimensions, weight of a standard 1-yd mode'. Roura Iron Works.

## SAFETY, SANITATION

**282 Dry Chemical Extinguishers**—New quick-acting fire extinguishers of the dry chemical type in 20 and 30 'b sizes are covered in Form C-104. C-O-TWO Fire Equipment Co.

**283 Advice on Washrooms**—Information on company's washroom advisory service is available to plant engineers. Tells of plans and specific suggestions for improving washrooms which are included in this service. Scott Paper Co.

**284 Group Washing Equipment**—Washfountains designed for modern group washing requirements for industrial plants, institutions are shown in Bu letin D-766. Bradley Washfountain Co.

## DUST CONTROL

**285 Dust Control Brochure**—Dust and fume control in many industries is the subject of this comprehensive 24-pp booklet. Tells how cloth-tube type dust collectors are handling complex problems in 33 typical installations, all illustrated. Covers use of these collectors in chemical processing, coal cleaning, sewage disposal, many other applications. American Wheelabrator & Equipment Corp.

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▶ Manufacturers of a full and outstanding line of alloy and carbon wrenches for 35 years. You will like Fairmount service. It is geared to your individual needs.

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# Centralize

## YOUR AUTOMATIC MOTOR CONTROLS FOR NEATER, SAFER INSTALLATIONS

Allen-Bradley multi-unit control centers concentrate all motor controls for a group of machines . . . or for your entire plant . . . in one spot. They make a compact installation that is safer and neater than scattered groups of individual controls. Inspection is centralized for easier and better maintenance. These control centers are designed and built to the usual Allen-Bradley quality standards.

Allen-Bradley Co., 1317 S. First St.
Milwaukee 4, Wis.

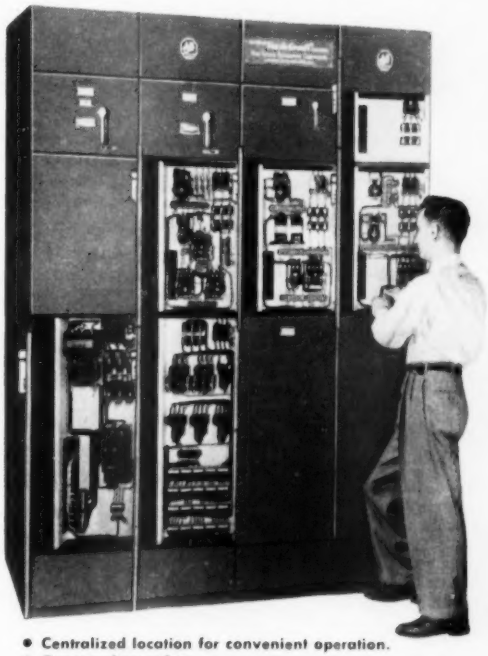
**Send for this idea-packed 28-page illustrated bulletin on Allen-Bradley Multi-unit Control Centers.**

**ALLEN-BRADLEY**

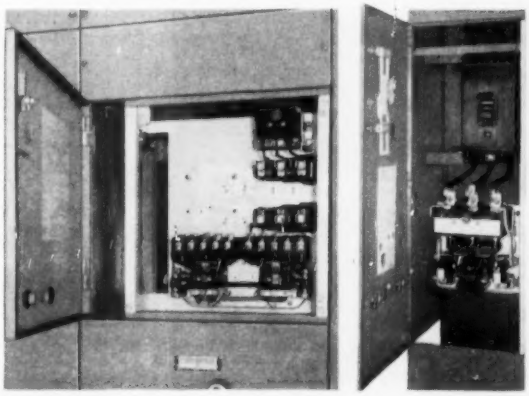
SOLENOID MOTOR CONTROL

A-B Quality

- **Easy to add and change motor controls to meet varying plant requirements.**



- **Centralized location for convenient operation.**
- **Greater plant safety.**
- **Centralized maintenance.**



- **Available with manual disconnect units or circuit breakers for complete circuit protection.**

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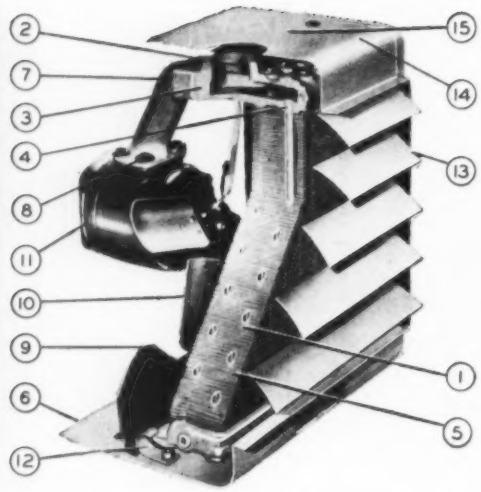
THESE **YOUNG** FEATURES MEAN GREATER UNIT HEATER EFFICIENCY




Young Type "SH" Unit Heaters are designed to provide a maximum amount of heat for warming "cold spots," as well as for general space heating applications. They are available in 14 sizes for hot water or steam systems up to 150 lbs. pressure.

The salient design features incorporated in the Young Unit Heater are shown above in cutaway view. 1—Efficient tube-and-fin type heating element. 2—Full size supply and return tappings. 3—Special cast iron used in supply and return headers. 4—Tubes rolled into headers and reinforced with ferrules. 5—Fins are mechanically bonded to tubes. 6—Steel casing insulated from heating element . . . all welded construction. 7—Streamlined motor bracket. 8—Rubber insulated motor mounting. 9—Aerodynamic fan shroud. 10—Fan gives maximum air delivery and operates quietly. 11—Motor designed for Unit Heater operation. 12—Spring mounting permits expansion and contraction of heating element. 13—Sturdy, adjustable louvers. 14—Gray metallic finish. 15—Provision made for hanging unit independent of piping.

*"Vertiflow" and Cabinet type models also available. Catalogs sent upon request.*

**YOUNG RADIATOR COMPANY** General Offices: RACINE, WISCONSIN
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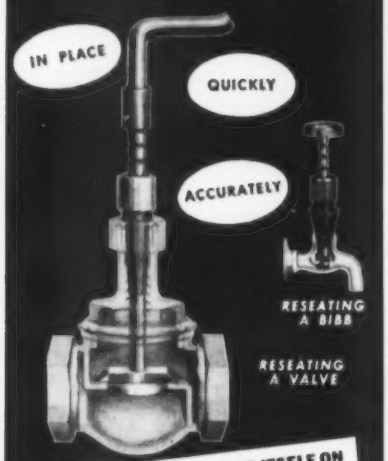
RESEAT VALVES AND BIBBS



PAYS FOR ITSELF ON FIRST 2 OR 3 JOBS!
Don't junk expensive globe or angle valves, bibbs, fixtures—reseat them! Order Skinner *Valve and Bibb Reseater*. Easy to use. Guaranteed cutters leave seat glass-smooth, level, tight.
1/4" to 2" . . . . $35.75
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CAL-WIC WIRE CLOTH
In all Meshes, Weaves and Weights

Filtering, screening or grading—whatever your special job demands may be—Cal-Wic Wire Cloth is available in the right mesh, weave or weight to meet your requirements. Resistance to corrosion, abrasion and temperature extremes assured through the use of appropriate metals and alloys.

The long-wearing qualities of Cal-Wic Wire Cloth take on added importance during times like the present.

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WICKWIRE SPENCER STEEL DIVISION—Clinton, Mass.

CAL-WIC
INDUSTRIAL SCREENS
CF&I

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# DATA FILE

(Begins on page 159)

**286 Dust Control Technology**—Detailed selection, operation and maintenance data are contained in this 50-pp digest-size book, "Industrial Dust Control Through Exhaust Systems." Treats exhaust hoods, piping systems, dust collecting equipment, exhausters and drives. Lists basic methods of dust control and analyzes elements of exhaust systems. Pangborn Corp.

**287 Manual of Exhaust Hood Design**—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust sources. American Air Filter Co., Inc.

**288 Dust Recovery**—"Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoints of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

**289 Dust Control**—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.

**290 Tubular Dust Filters**—Advantages, uses and design of tubular dust filters are given in Bulletin 24-D. Presents both single compartment and automatic continuous multi-compartment units. Describes bag shaker mechanism, dust discharge valve, dust hoppers. Ruemelin Mfg. Co.

**291 Dust Collectors**—Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

## VENTILATING, DEHUMIDIFYING, AIR CONDITIONING

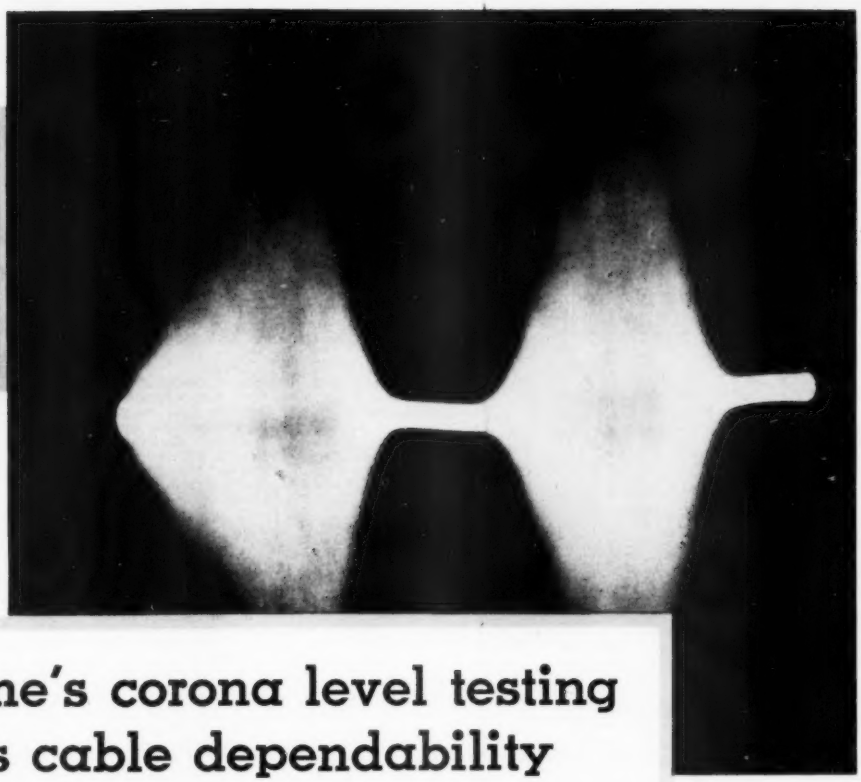
**292 Air Conditioning Cabinets**—Engineering Bulletin 3703A, 40 pp, describes and illustrates manufacturer's Model G cabinets, central units available in both horizontal and vertical models, providing 875 to 22,000 cfm and offering combinations for any function or functions of air conditioning. Booklet gives construction details, discusses heating and cooling coils. Buffalo Forge Co.

**293 How Conditioning Units Can Help**—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling, hot water, steam heating. Clarage Fan Co.

**294 Vaneaxial Fans**—Bulletin J-611 is a 16-pp booklet presenting company's Axivane Series 1000 fans. Explains advantages of vaneaxial design and the versatility afforded by adjustable blades for ventilating and other industrial applications. Fans in this line consist of 136 models from 18 to 84 in. dia., volumes to 150,000 cfm. Photos of typical installations included. Joy Mfg. Co.

**295 Putting Air to Work**—Catalog 600 is an excellent, 60-pp reference text on air and products to put it to work. For plant engineers concerned with heating and ventilating of plant areas; air conditioning installations; means of exhausting fumes, gases and dusts; conveying chips and granular materials; elimination of airborne dirt—this book is a valuable tool. It's packed with information on selecting and applying equipment, and there is a section of frequently-used reference data. Sturtevant Div., Westinghouse Electric Corp.

Specially designed ionization detector for routine factory use measures corona level of all-insulated cables rated at 3000 volts or over.



# Why Rome's corona level testing assures cable dependability

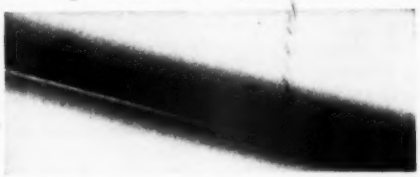
The picture above means trouble. It is an oscilloscope trace of internal ionization in an insulated cable.

Ionization is caused by the electrical break-down of air in pockets within the insulation, or between the insulation and conductor or shield. Should this ionization occur at a value below the operating voltage of the cable, several destructive electrical effects may occur such as possible ozone cutting, reduced dielectric strength, and a substantial increase in dielectric losses. Any of these hazards could result in early failure or reduce the efficient performance life of the cable.

Ionization is particularly dangerous because it cannot be detected by the ordinary visual, physical and electrical testing methods usually applied to cable.

So, to prevent guesswork, to assure you of maximum protection against ionization, *every foot of Rome insulated cable, rated at 3000 volts or over, is thoroughly tested by a specially designed ionization detector.* This instrument accurately measures the corona level of the entire cable. Unless the ionization voltage exceeds the intended operating voltage of the cable, the cable is rejected.

This is one more extra step in Rome Cable's standard manufacturing procedure that assures dependability. This completely new *NONDESTRUCTIVE* method of testing was developed by Rome Cable engineers and was first described in AIEE paper 48-198, "The Measurement and Investigation of Ionization Level of Rubber Insulated Cables," presented in August, 1948.



This X-ray reveals loose insulation—a major cause of ionization.

500,000 CM stranded single conductor RoZone insulated, shielded, RoPrene sheathed power cable . . . 15,000 volts, grounded neutral.

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can't burn out when stalled

*Sensationally Different*

**KELLER Air Hoist**

**with positive displacement piston-type air motors**

**VARIABLE SPEED** from 0 to 17 fpm permits safe handling of fragile loads. The load hook can be "inched" up or down for accurate spotting.

**LIGHTWEIGHT**—A 1,000-lb capacity hoist weighs only 30 lb—easy to carry up or down a ladder, and move from job to job.

**DUST, FUMES** cannot injure an air motor. Nor will it burn out, even if stalled all day long.

**LOW MAINTENANCE** because of simple design. Only a few working parts, and these are fully enclosed. Two grease fittings lubricate all working parts.

**CONTINUOUS DUTY**—Keller Air Hoists can be used continuously over periods of hours (or days) without danger of shortening motor life.

SEND FOR DETAILED INFORMATION

**KELLER**

*Pneumatic Tools*

**KELLER TOOL CO., GRAND HAVEN, MICH.**

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# DATA FILE

(Begins on page 159)

**296 Heating, Air Conditioning Book**—Bulletin PB-290, 36 pp, is a complete, condensed catalog covering company's full line of air conditioning, heating, ventilating and heat transfer equipment. Supplements some 40 specialized bulletins on various product lines. The Trane Co.

**297 Push-Button Ventilation**—Six-pp Bulletin 680 gives sizes, dimensions and performance data on power roof ventilators for flat, curved or peak roof installations, capacities to 78,800 cfm. Cites advantages of ventilation by positive air displacement. Propellair Div., Robbins & Myers, Inc.

**298 Fans and Blowers**—Illustrated Catalog 21A, 64 pp, gives ordering information on company's fans, blowers, roof ventilators and related products, including application suggestions, ratings, dimensions. Explains principle of curved orifice air-seal ring incorporated. Provides directions for installation and operations, maintenance and lubrication. Hartzell Propeller Fan Co.

**299 Roof Ventilators, Louvers**—Now available to qualified plant engineers is a collection of literature on gravity and powered proof ventilators and ventilating louvers. Includes a résumé of engineering helps for working out a ventilating problem—a guide for estimating ventilating requirements, installation procedures, sizes and capacities. The Swartwout Co.

**300 To Keep Out Moisture**—Vents designed for easy installation on any roof to keep out wet, foul air are described in this literature. Muckle Manufacturing Co.

## CONSTRUCTION

**301 Glass Block Fenestration**—The natural ventilation characteristics of glass block fenestration are presented in this illustrated report of a test project. In some 88 pages, report covers sun hoods, window types, dual outlets, air speeds, double loaded variations, reverse draft and ventilation below window sill. Test data is summarized and recommendations included. Although test was conducted on glass block fenestration in school buildings, the information will be of interest to those concerned with industrial applications of glass block. Kimble Glass Co.

**302 Industrial Steel Windows**—Planned to offer comprehensive easy-to-find data, this 24-pp catalog gives descriptions, specifications, sizes, uses and advantages of Fenestra pivoted windows, commercial projected windows, and security windows used separately and in combination, also continuous windows used mainly for top-lighting in monitor and sawtooth roof construction. Detroit Steel Products Co.

**303 Heat Absorbing Glass**—This 16-pp catalog describes Coolite, a glass designed to trap and absorb much of the sun's heat and to filter out annoying glare. Discusses types and thicknesses, gives light transmission data. Pictures many industrial installations and shows how conditioned natural illumination helps reduce operating and maintenance costs. Mississippi Glass Co.

**304 Technical Manual on Plywood**—Available basic data on Douglas fir plywood, its properties and use, are offered in looseleaf sections with firm binder. Presents engineering information about this panel material and its performance in varying applications. Covers commercial standards, designing with plywood, prevention of condensation, lateral bearing strength of nailed plywood joints, deflection. Please give your title when requesting this book. Douglas Fir Plywood Assn.

**305 How Hardboards Improve Methods**—Twelve-pp Form 5202, on production economies in plant maintenance, materials handling and processing, enumerates applications and specifies types and thicknesses of company's Presdwood for specific


The Herman Nelson line of UNIT BLOWERS offers industry the most diversified selection of packaged centrifugal fans available.

For a "BLOW-BY-BLOWER" description write to . . .

American Air Filter COMPANY, INC.
Louisville 8, Kentucky

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**ARMSTRONG BROS.**
**Better PIPE TOOLS**

**CHAIN TONGS**

"Reversible," "Standard" and "Ideal" types in all sizes. Jaws are drop forged from special steel, are carefully milled, heat treated, hardened and tested. The Handles are forged spring steel. The Chains are proof-tested to ⅔ catalog strength (1,200 lb. to 40,000 lb.). "Reversible" Jaws give double jaw life. "Standard" Jaws have extra bearing on the handle and forged-in chain guides. The "Ideal" Tongs have V shaped teeth for a sure grip on irregular shapes—fittings, etc.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
5207 W. ARMSTRONG AVENUE • CHICAGO 30, ILL.

**For more facts circle 620 on Reply Card**

# The difference between Life... and Death...

"Why should you give blood? Ask me—I ought to know. I fought in Korea. But since then I've been through the biggest battle of all—the battle for life itself. And it was blood—and blood alone—that saved me. Don't know when I'll be in a position to start repaying my debt by giving some blood of my own. But I will—some day. You can count on it!"

All kinds of people give blood—for all kinds of reasons. But every reason for giving blood is a *special* reason . . . just as every American life that can be saved at any time and at any place . . . is special. So whatever *your* reason for giving blood, this you can be sure of: Whether it goes to a combat area, a local hospital, or for Civil Defense needs—this priceless, painless gift will some day save an American life!

**Give Blood Now**

***CALL YOUR RED CROSS TODAY!***

***NATIONAL BLOOD PROGRAM***

**Business Executives!**

**✓Check These Questions!**

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ☐ Have you given your employees time off to make blood donations?
- ☐ Has your company given any recognition to donors?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of co-operation?
- ☐ Was this information given through Plant Bulletin or House Magazine?
- ☐ Have you conducted a Donor Pledge Campaign in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?

Remember, as long as a *single* pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent!*

# POWELL—a *trusted* name in flow control equipment

Fig. 1793
125-pound Iron Body Bronze Mounted Gate Valve for oil, water, gas and low pressure steam services. Sizes 2" to 30", incl.

*To be trustworthy is one of the finest attributes of mankind. In flow control equipment it is essential.*

*Through many years the actual service records of countless valves bearing the name "Powell" prove that they can always be trusted to give the utmost in dependable, trouble-free performance.*

**The Wm. Powell Co.**
**Cincinnati 22**
**Ohio**

# POWELL

BRONZE, IRON, STEEL AND CORROSION-RESISTING VALVES

For more facts circle 622 on Reply Card

# DATA FILE

(Begins on page 159)

purposes. Lists 28 advantages of Presdwood, describes its use in architectural applications, bins, utility boards, cabinetwork, containers, booths and ventilators, work surfaces. Masonite Corp.

**306 Metal Framing Guide**—Although pocket-sized, 80-pp Catalog 800 is packed with illustrated information on an all-purpose metal framing system, and serves as a handy reference text. Fully indexed, shows the versatile basic channel, suggests possible combinations and pictures typical fittings and parts. Provides design and application data and pictures some of the almost unlimited uses for this framing system. Includes reference tables. Available to qualified plant engineers. Unistrut Products Co.

**307 Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features; gives fabricating data, sizes, allowable loads. Pictures some applications. Alan Wood Steel Co.

**308 Flooring Guide**—Plant engineers interested in specifying resilient tile flooring will find valuable information in Form 107. Tells what each type of resilient tile is recommended, and not recommended for. Specific information is given for asphalt tile, cork tile, rubber and grease-proof tiles. Kentile, Inc.

## MAINTENANCE

**309 Basic Roofing Information**—"What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also special features of company's roofing materials. Johns-Manville.

**310 Maintenance Manual**—"Over the Rough Spots" is a 48-pp pocket size booklet giving the answer to practically every repair or building maintenance problem. Tells how to patch holes and resurface floors, how to prevent water seepage in underground foundations, repair leaky roofs, preserve concrete or wood surfaces, protect structural steel from rusting, and gives many time and labor saving methods. Generously illustrated. Stonhard Co.

**311 Protective Paints**—Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis, and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for use on wood, metal surfaces. Cellulose Products Dept., Hercules Powder Co.

**312 Tar Base Coatings**—Now available is a collection of five bulletins on company's 100 series of cold applied tar base coatings. One bulletin gives general information on the full line and provides an application chart. The others give detailed specifications and application information on the various types. These include a coating for protection against severest corrosive conditions; a thin high gloss coating for general maintenance purposes; a coating for protection against generally severe corrosive conditions; and one for water tank interiors. Pittsburgh Coke & Chemical Co.

**313 Building Maintenance**—Handbook 7 offers 64 pp of information on floor surfacings, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.

**315 Proper Care of Floors**—Filled with what-to-use and how-to-use-it information, this 32-pp booklet is a well-written, practical text on floors. Presents floor preservation as a triple process involving cleaning, sealing and maintaining. Discusses various floor surfaces and their


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HYDRO-SHEAVE®

Adds

Balanced performance to any

Conveyor

**PROBLEM:** Liggett and Myers Tobacco Company—makers of Chesterfield cigarettes—has chain conveyors up to ⅓ mile long in its big Durham, N. C. plant. Traveling 60 feet per minute, one of the long conveyors hustles loaded trays from cigarette machines to package room. With straight mechanical drive, starting the conveyor was difficult without chain breakage and swaying of the trays.

**SOLUTION:** A Twin Disc 8.4" HYDRO-SHEAVE Drive was mounted on the 5 hp, 1750 motor, driving a 9.75-to-1 reducer through V-belts. Today, the conveyor starts *smoothly*—with no tray-swaying or chain-breaking since installation! By eliminating mechanical connection between power source and driven equipment, the HYDRO-SHEAVE *absorbs* starting and running shocks—lets the motor accelerate rapidly and easily—adds balanced performance throughout.

For further information on Twin Disc HYDRO-SHEAVE Drives, write today for Bulletin No. 145-B.

Twin Disc HYDRO-SHEAVE® Drives —in capacities from ¾ to 50 hp —solve many shock load, vibration, and excessive starting current problems throughout industry.

*Built for a Long Life . . .*

*Backed for a Lifetime*

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CLUTCHES AND HYDRAULIC DRIVES

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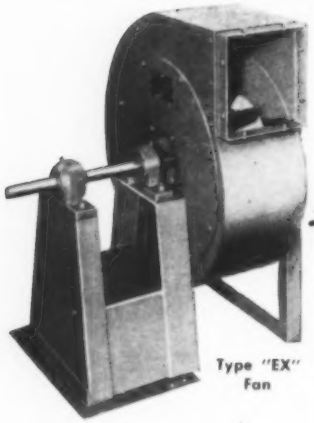

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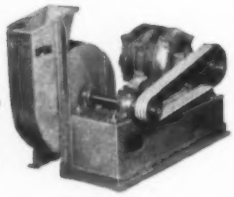
# "STANDARD" with Bayley Yet "SPECIAL" For You!

FANS built precisely right for your exhaust ventilation or pneumatic conveying requirements await your selection from BAYLEY'S wide range of *standard* designs. . . . Wheels for Gas or Air-Handling—spark and explosion-proof—sealed housings. . . . Sturdily constructed to provide years of dependable service.



Type "H" Blower For High Pressure Use

***DESCRIPTIVE BULLETINS and Data sent promptly upon your request.***

**Bayley BLOWER COMPANY**
Engineered Air-Handling Equipment

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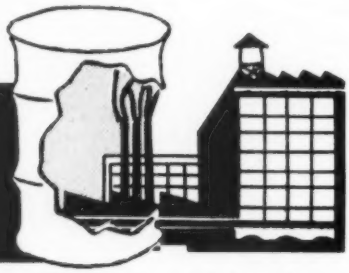
***SIMPLIFY and SAVE*** *on lubricating work with*

**ALBANY PRESSUREGREASE *Universal***



***Hundreds of plants now use this Improved All-Purpose Lubricant for:***

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Engineers like the way Albany Pressuregrease Universal clings to metal at all temperatures. Its high resistance to moisture prevents rust. Assures cleaner floors because it will not run off at high temperatures or high speeds. Ask for it at your mill supply house.

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**FREE:** Send today for helpful copy of Albany Recommendation Chart

***Albany*** **Lubrication Products**

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## DATA FILE

(Begins on page 159)

special problems. Gives helpful hints on floor maintenance and provides a handy chart covering preparation procedures and products for 12 common floor surfaces including cement, cork, tile, linoleum, mastic wood. West Disinfecting Co.

**316 Roofing Manual**—Engineering data on roofing is given in Roofing Specifications Book, 32 pp. Covers coal-tar pitch roofing, waterproofing, dampproofing, roof insulation, flashings. Contains illustrations. Tar Products Div., Koppers Co., Inc.

**317 Chemical Cleaning Service**—Reduced maintenance costs and outage time are among advantages of company's chemical cleaning service for steam equipment and water lines discussed in this 8-pp bulletin. Before-and-after photos show some actual cleaning jobs. Dowell Inc.

**319 Floor Maintenance Buyers' Guide**—Brief, but practica' application details on floor machines and accessories and a wide range of floor cleansers, waxes and other preparations are presented in this illustrated bulletin. Includes packaging information. Finnell System, Inc.

**320 For the Overhead Jobs**—Scaffolds designed to make overhead work safer and easier are described in 16-pp Form 10-852. Illustrates and discusses adjustability, large working platform, easy assembly, self-locking trusses and other advantages. Shows how they are readily stacked for height. Baker-Roos, Inc.

**321 Blower-Suction Cleaner**—Data on a portable combination blower-suction cleaner for cleaning machinery, motors, stock bins is offered. Describes models available, attachments for a wide range of cleaning jobs. Clements Mfg. Co.

### TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

**322 Idea Book**—Sixty pages of "1001 Shortcuts" for production, construction and maintenance make this hand-tool and hydraulic-tool handbook one of the most useful ever. Large photos and concise descriptions give ideas developed and successfully applied by hundreds of tool users. One of the big values attached to the "Idea Book" comes from the manner in which it stimulates the user to create his own ideas. Typical job photos suggest the general principles of the applications. Blackhawk Mfg. Co.

**323 Pipe Tool Book**—This catalog and data book gives information on pipe and bolt machines, power units, ratchet threaders, reamers and cutters, other power and hand tools. Includes popular "operating guide" section, fully illustrated with easy-to-grasp drawings. Beaver Pipe Tools, Inc.

**324 Resistance Welding**—Featured in this 24-pp catalog are newly-designed tips and holders recently added to company's equipment. Full information is also given about other holders, tips, seam welder wheels and shafts, and bushings, in manufacturer's line, as well as flash, butt, barrel and projection welding dies. Ampco Metal, Inc.

**326 For Faster Fastening**—Form 35-A explains and illustrates company's system of fastening tools and fasteners for use with steel, wood, concrete, fabricated hard materials. Ramset Fastening System, Inc.

**327 Where to Use Your Stud Driver**—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of predrilled fixtures. Remington Arms Co., Inc.

*"National security is impossible without financial security of individual citizens..."*

**FRED MAYTAG**
The Maytag Company

***"Ingenious research and the ability to produce . . . which have helped to make the United States the world's greatest nation . . . could not have been realized without the savings of millions of thrifty persons. Savings of individuals financed new inventions, developed others. The Payroll Savings Plan for purchasing Savings Bonds regularly provides an easier way for American workers to save for future spending or investment, for their own security, and for their nation's security. Our experience at the Maytag Company has shown us that a successful Payroll Savings program can be the foundation and the cornerstone of happy employee relations."***

Let's point up Mr. Maytag's concise summary of the Payroll Savings Plan with a few very recent figures:

• at the close of February, 1953, the *cash value* of Series E Bonds held by *individuals* reached a new high: $35.5 billion. This is $1 billion more than the value of the Bonds held on May 1, 1951, when E Bonds began to mature.

• to this encouraging reservoir of future purchasing power, 8,000,000 Payroll Savers are adding $160,000,000 per month by their consistent investment in U.S. Savings Bonds.

• unit sales of E Bonds in 1952 reached the highest level of the past six years—more than 77 million individual pieces. Of the 77 million units, 67 million were in the $25 and $50 denominations—the bonds bought chiefly by Payroll Savers.

• Payroll Savers are serious savers—of the approximately $6 billion Series E Bonds which had become due up to the end of March, $4.5 billion, or 75%, were retained by their owners beyond maturity.

If you are not among the 45,000 companies that make the benefits of the Payroll Savings Plan available to their employees . . . or if you do have a Plan and your employee participation is less than 50%, a telegram or letter to Savings Bond Division, U.S. Treasury Department, Washington Building, Washington, D. C., will bring you all the information and assistance needed to build a *good* Payroll Savings Plan.

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**PLANT ENGINEERING**

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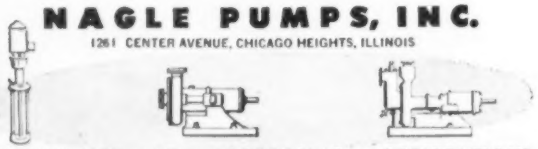

PUMPS FOR ABRASIVE AND CORROSIVE APPLICATIONS

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# SHOP TIP

## For an Easier Way to Remove Packing

Here is a rugged hand-tool that "works around corners" for removing old packing from stuffing boxes. The picture shows how a pair of these flexible handled tools operate around obstructions for snagging out those old packing rings. All steel—tempered tool steel corscrew bit.

**DURA HOOKS**

Ask your jobber—or write for DURA HOOK Bulletin No. DHPN covering sizes and prices.

The PERFECT SEAL

DURAMETALLIC CORPORATION
KALAMAZOO MICHIGAN

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# DATA FILE

(Begins on page 159)

**328 Pipe Tool Ordering Guide**—Catalog 2-51, 8-pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

**329 Metal Spraying Gun**—Company's Type 4E gun for high-speed spraying with all metals is described in Bulletin 94. A cutaway drawing shows construction features of the gun which is designed for tool-post mounting or hand operation. Metallizing Engineering Co., Inc.

**330 Socket Wrenches**—Sixteen-pp Catalog 460 presents a line of socket wrenches in sizes from $\frac{1}{4}$ to $\frac{3}{4}$ in. square drive, also socket wrench sets, heavy duty sockets and open end wrenches. Illustrated, gives sizes, weights and packaging information. Fairmount Tool & Forging, Inc.

**331 Simplified Isolation**—A simplified method of machine isolation which utilizes pads and cement is described in this small folder. Explains how it reduces maintenance cost. The Felters Co.

## PUMPS, COMPRESSORS

**332 Installing a Pump**—Blaming many pump operating troubles on improper pump selection and installation, this 8-pp technical article tells what should be taken into consideration when ordering a pump. Titled, "Studying the Installation," it discusses head, viscosity, pipe friction, suction lifts, horsepower and materials. Illustrated. Viking Pump Co.

**333 Pump Service Manual**—Bulletin 202 is a 20-pp booklet covering installation, operation and maintenance of manufacturer's reciprocating pumps and providing helpful engineering information. Suction piping, valves and accessories for proper operation are discussed. Sectional drawings and parts lists are provided, also high and low capacity steam consumption curves, general information on water, properties of steam. Warren Steam Pump Co., Inc.

**335 How to Solve Pumping Problems**—A new printing of this popular 36-pp booklet makes it again available to plant engineers. Filled with helpful technical information, explains design and operation of rotary gear pumps and discusses factors of pumping problems, covering some sample ones in detail. Illustrated.


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ALL SIZES TO FIT YOUR GAGES

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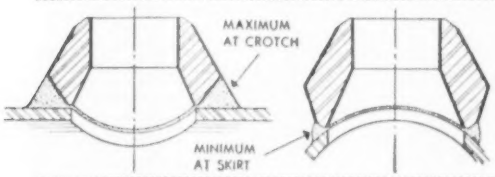
# WELDOLET WELDING FITTINGS
## MEAN PERMANENT PIPING
## ...PERMANENT SAVINGS

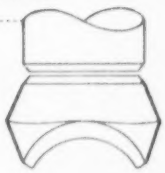
Here's Why

Every fitting is shaped to fit the pipe and is self-aligning.

The template is the inside of the fitting. The hole in the run-pipe can be cut out either before or after the fitting is installed.




Welded as indicated—to fill in 50° bevel at crotch, blending into 35° bevel at skirt—full reinforcement is accomplished.



The outlet is machine-beveled for quick, easy butt-welding of the branch pipe—shop or field fabrication.

Here's How

1. The WeldOlet is raised off the run pipe to establish proper weld gap, as required by Code for all types of branch connections. This is accomplished by placing spacers, e.g. welding rods, under the fitting.
2. The base joint is tack welded, preferably at four points, each half way between the crotch and skirt sections of the fitting. The spacers are then removed.
3. The stringer bead—or beads—is applied completely around the base of the fitting. The established weld gap assures full penetration.
4. Additional passes are applied as necessary to fill in the tapered base bevel of the fitting. The intermediate passes should not be continuous. Re-inforcing welds should be made at the crotch bevel area at each side of the fitting only. A continuous cover bead should be added, filling the bevel at the base of the fitting at the crotch and skirt sections.

**TO COMPLETELY SAFEGUARD AGAINST:**

- high pressures
- high temperatures
- internal corrosion
- external stresses

**TO PROVIDE:**

- improved fluid flow
- trouble-free and permanent piping systems

**TO ACCOMPLISH ALL THESE THINGS IN THE MOST ECONOMICAL MANNER . . . SPECIFY AND USE**

## BONNEY WELDOLET WELDING FITTINGS

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*FOR COMPLETE ENGINEERING DATA WRITE FOR YOUR BONNEY W-3 WELDOLET CATALOG.*

WELDING FITTINGS DIVISION

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ENG. DEPT., 727 MEADOW STREET
ALLENTOWN, PENNSYLVANIA

**For more facts circle 628 on Reply Card**

# DATA FILE

(Begins on page 159)

provides friction loss and conversion tables, electrical data, viscosities of liquids, construction materials for handling various liquids, resistance of valves and fittings to flow of fluids. Geo. D. Roper Corp.

**337 "A Turn for the Better"**—Bulletin 30-B, 8 pp, discusses manufacturer's improved Moyno pump, explaining in detail its progressing cavity feature and showing how the rotary motion created provides continuous flow at positive pressure. Stresses performance advantages of the pump. Pump Div., Robbins & Myers, Inc.

**338 Condensed Pump Data**—Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, applications, and features. Goulds Pumps, Inc.

**339 Multi-Stage Compressors**—Featured in 36-pp Bulletin 116 is a presentation of engineering data and performance characteristics to enable plant engineers to approximate power requirements, rotative speed and discharge temperature for most multi-stage centrifugal compressor applications. Clark Bros. Co., Inc.

**340 Air Compressor Selection Data**—Factors to be considered in selecting a compressor are discussed and selector charts provided in 20-pp Bulletin IDC 9302-3, covering manufacturer's Y and G air compressors. The Y line includes tank mounted and bedplate units, single- and two-stage types. Special features of each model are described, dimensions and ratings given. Westinghouse Air Brake Co.

**341 Improved Compressor**—How this manufacturer's Spiraxial compressor for air or gas is designed to provide peak efficiencies with minimum servicing is explained in Bulletin SC-152. Construction and design details are discussed in detail. Roots-Connersville Blower.

**342 Centrifugal Compressors**—Twelve-pp Bulletin 109 describes and pictures single-stage centrifugal compressors for delivering large capacities of pulsation-free air or gases. Their functions, applications, ratings, construction features, arrangements and methods of control are presented. American Blower Corp.

## PACKINGS, SEALS, GASKETS

**343 Buyer's Guide on Packings**—Twenty-pp Catalog PC-101 brings together all material on company's Palmetto packings and includes data on packing for liquid pistons on inside-packed piston pumps. Greene, Tweed & Co.

**344 Shaft Seals**—Form 455, 12 pp, presents a mechanical seal that rotates with the shaft and is designed to meet sealing requirements of centrifugal and rotary pumps, agitators, blowers, other rotating equipment. Explains advantages of these seals, gives recommended uses for six types, also for a double seal and a cartridge sleeve seal. Durametallic Corp.

**345 Braided Rod Packing**—This 8-pp bulletin outlines advantages of company's lattice-braid rod packing. Contains sectional drawings, showing their unique structure, illustrations of types available, tables of service recommendations, specifications. The Garlock Packing Co.

**346 Industrial Gaskets**—This highly informative 50-pp catalog covers an extensive line of gaskets and teflon products, including practically all types of metal, metal-asbestos and special gaskets as well as teflon stock. Includes both engineering and ordering data, application and installation tips. United States Gasket Co.

**347 Metallic Packing**—This folder is devoted to company's elastic metallic packing intended for frictionless operation by means of an oil seal. Photos and text tell how seal is constructed, operates and is used. A. W. Chesterton Co.

**348 Long Wearing Piston Packing**—Form 4502, 8 pp, presents composition cups for packing pistons of air and hydraulic cylinders and reciprocating pumps. Engineering information covers properties, textures, temperature and pressure data, sizes. Darling Valve & Mfg. Co.

## BOILERS, GENERATORS

**350 How Much for Steam**—Here's a "slide rule" calculator for computing steam costs. It's pocket-sized, and enables a plant engineer to find comparative steam costs per 1000 lb. using coal, oil or gas, and based on fuel costs of price per ton, gallon, cubic foot. Cleaver-Brooks Co.

**352 Steam Generators**—Illustrated Bulletin SB43, 20 pp, describes company's VL factory assembled generators combining 2-drum water-tube boiler, integral water cooled furnace, brick work, insulation and steel casing. A large cutaway illustration shows design details, and gas travel, circulation and furnace interior are also pictured. Use of the generator with various fuels and firing arrangements is covered, dimensions included. Erie City Iron Works.

**353 Packaged Steam Generators**—This new 16-pp booklet on steam generators is profusely illustrated in color providing photos, cutaway and schematic drawings and describing in detail the construction and operating principles. Explains induced draft, dry steam, four-pass downdraft design, 5 sq ft of heating surface per Bhp, flexibility of operation, and oil, gas and combination gas-oil burning equipment. Superior Combustion Industries, Inc.


you can't beat the accuracy and dependability of

BOWSER

XACTO METERS

XACTO is the meter that's changing liquid-handling habits in every industry where liquid measure and control have been a problem.

XACTO safely handles over 600 different liquids in processing, blending, packaging and many other batching or continuous operations.

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METAL PROCESSING BELTS

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Fabricated in steel or stainless steel in various weaves and constructions to operate efficiently and dependably from sub-zero temperatures up to 2100° F. Try us on your next order.

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## 4 TYPES FIT ALL MAKES OF SPRAY GUNS

**ORDER CORRECT MODEL**

- **A** Fits all models of SPRA-CO spray guns.
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A CLEAR-FLO strainer on the end of the intake tube of your spray gun keeps production humming. Paint need not be pre-strained, and experience shows that you SAVE ONE MAN HOUR PER GUN PER DAY by eliminating time out for cleaning, reworking spoiled work. Cleans itself when gun is cleaned. Quickly and easily installed and changed. Manufactured from finest brass screening. Cost so little, lasts so long, each Clear-Flo strainer more than pays for itself.

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## ONE CONTROL DOES THE JOB OF TWO

DA-400

Mercoid DA-400 Series Pressure Controls incorporate a single bourdon tube which actuates two independently adjustable Mercoid magnet operated mercury switches to accomplish various circuit operations. For example:

1. Close one alarm circuit at high pressure and another at low pressure with both circuits open over operating range.
2. As an electrical interlock to open one circuit as pressure rises above and the second circuit as the pressure drops below operating range.
3. To provide two-stage control by opening or closing one circuit on a rise in pressure and the second circuit on a further rise in pressure.

Available with Explosion-Proof or Weatherproof Housing

Equipped with calibrated dial and outside adjustments—Ranges 0-30 psi to 300-2500 psi—The Mercoid magnet operated mercury switches are not affected by harmful effects of dust, dirt, or corrosion—your assurance of millions of operations.

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**NO JAMMING**
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## MULTIPORT VALVES

In vapor systems where pressure relief to atmosphere is a must for safety—maximum savings important, Cochrane Multiport Pressure Relief Valves are the answer.

**Safer**—multiple "vapor cushioned" valve discs instead of one ordinary valve disc insure discharge upon overpressure without freezing, sticking or jamming.

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*3126 N. 17th Street, Philadelphia 32, Pa*

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# DATA FILE

(Begins on page 159)

**354 Oil or Gas Fired Automatic Boilers**—Boiler, burner, controls and safety features of 10 to 500 hp oil or gas fired automatic boilers are described in this 4-pp bulletin. Firing rates, dimensions and capacities are given for all models. Boiler Engineering & Supply Co., Inc.

## HEATING, COOLING

**356 Forced Air Space Heaters**—Illustrated Bulletin 523-B, 12 pp, is devoted to a line of forced air heaters for comfort heating, year-round ventilating, tempering make-up air, process drying and heat curing. Explains design efficiency, construction details, operating principle and flexibility of application. Advantages of the heaters are detailed. These heaters are direct fired by oil, gas or combination fuels. Dravo Corp.

**358 Faster Tank Heating, Cooling**—Bulletin IP-250, 8 pp, describes company's Platecoils, embossed metal sheets welded to form compact units through which required heating, or cooling, medium is circulated under pressure. Explains lower costs, faster tank cooling or heating, lighter weight of the units. Kold-Hold Mfg. Co.

**359 Heat-on-Wheels for Industry**—Illustrated Form 3574, 16 pp, is the story of how manufacturer's portable heaters can solve emergency heating problems. Shows how these heaters provide extra heat for the hard-to-heat spots, and for extra cold areas, to spot heat where needed, and for ventilating, drying and thawing jobs. Herman Nelson Div., American Air Filter Co., Inc.

**361 Heat Transfer Equipment**—An excellent source of information on shell and tube heat transfer equipment, 28-pp Catalog DM-1150 covers heat exchangers, tank suction heaters, oil preheaters, condensers, evaporators, after-coolers, gas coolers, centrifugal pumps and water heaters. Instructions for installation, operation and maintenance are included. Bell & Gossett Co.

**362 Industrial Dry Coolers**—Illustrated Bulletin DC-50, 12 pp, presents dry cooling equipment for small, "in-between," and heavy-duty cooling jobs and includes three recent models. Two are small "portable" units and the third a medium size unit. Although designed primarily for cooling engine jacket water, they can be used for cooling natural gas, lube oils, fluids of refining stages. The Marley Co., Inc.

## WATER CONDITIONING

**363 New Data on Zeolite Softeners**—Publication 4520-A is a recently revised edition of company's booklet on zeolite water softening. Provides a glossary of terms used in the process, data for laying out a zeolite softening plant, factors governing size of equipment, selection of zeolite materials and discussion of the four stages of operation of a sodium zeolite softener. Cochrane Corp.

**365 Boiler Scale—Formation and Prevention**—Technical Paper 98 is a 12-pp article covering the cause and prevention of boiler scale. Covers the mechanism of scale formation, effect of boiler scale, chemistry of scale formation, internal chemical treatment and chemical correctives. Diagrams of feeder systems, photos and solubility charts illustrate text. W. H. & L. D. Betz.

## INSULATION

**366 Insulating Wool**—Bulletin WB-1 describes a low density, resilient insulating material with high thermal efficiency and sound absorption characteristics; it is made of fine glass fibers. Discusses lightweight, easy handling, fire and moisture resistance and other advantages. Gives thermal conductivity and acoustical performance data, sizes. Glass Fibers Inc.

**367 Pipe Insulation**—Form 76-102 is a small folder stressing efficiency and economy of Amocel, a lightweight asbestos pipe insulation for temperatures to 650 F. Discusses its low thermal conductivity, high mechanical strength in relation to its weight. Union Asbestos & Rubber Co.

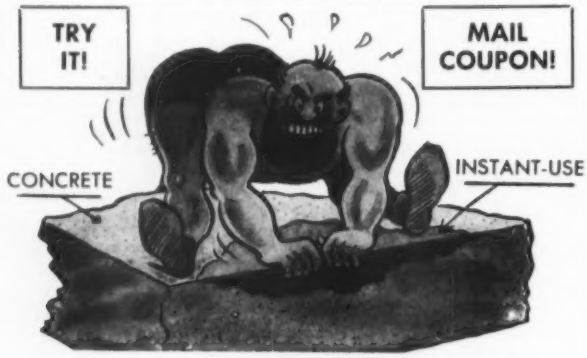
**368 One-Coat Insulation**—This 32-pp booklet describes company's Type D insulation, a sprayed-on coating for surfaces with temperature range from -40 to 300 F. Tells how one application of this coating not only insulates but also waterproofs, rustproofs, deadens sound, prevents condensation and resists fire. Tells how to apply. Insul-Mastic Corp. of America.

## OTHER EQUIPMENT

**370 Hose and Tubing**—Catalog CC-400 is a 16-pp illustrated quick-reference booklet on manufacturer's flexible metal hose and tubing. These products are made in two basic types: seamless and strip wound. Catalog shows wide range of available alloys and sizes, suggested uses; gives engineering data. The American Brass Co.

**371 Handbook on Fluid Circuits**—Now available to plant engineers is the second printing of "The Circuit Rider." This 32-pp pocket-size manual presents a down-to-earth discussion, together with drawings, of basic designs in fluid power circuits and points out the wide range of operations possible through the application of different types of such circuits. The Logansport Machine Co. Inc.

**372 Versatile Industrial Oil**—Described in 20-pp Form AD 4078 is an all-purpose oil offering protection for a wide range of industrial equiment, and available in 15 viscosity grades. Discusses six major characteristics of the oil; explains and pictures its use in hydraulic systems, speed reducers, air compressors, electric motors, hydraulic turbines, bearing systems, etc. A chart shows grades and uses, physical properties. Standard Oil Co. (Ind.)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***Sets Instantly!***

Repair broken factory floors without the usual traffic tie-up. Simply shovel INSTANT-USE into hole or rut—tamp smooth—truck over! No waiting! INSTANT-USE bonds tight to old concrete—right up to a feather edge. It's tough. Wears like iron. Won't crack or crumble. Install complete overlay where floors are badly chewed up. Used indoors or out. Immediate shipment.

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Please send me complete INSTANT-USE information, details of TRIAL ORDER PLAN and HAND BOOK OF BUILDING MAINTENANCE — no obligation. (Clip and attach Coupon to Co. letterhead.)

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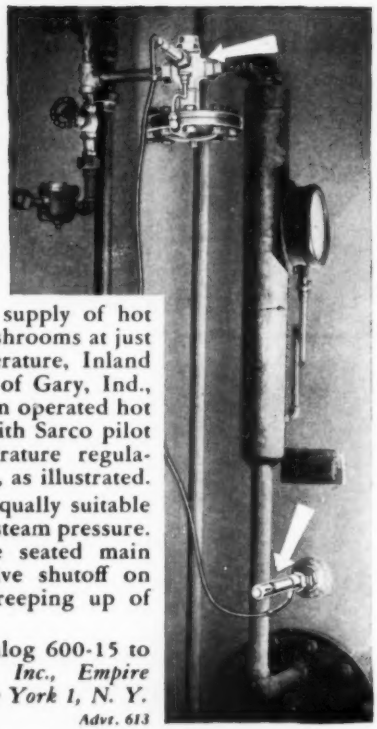
For more facts circle 634 on Reply Card

**Steel Mills prefer this simple Temperature Control**



For a constant supply of hot water in the washrooms at just the right temperature, Inland Steel Company of Gary, Ind., equip their steam operated hot water heaters with Sarco pilot operated temperature regulators, type 24-30, as illustrated.

This type is equally suitable for high or low steam pressure. It has a single seated main valve for positive shutoff on no load. No creeping up of temperature!

Write for catalog 600-15 to *Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.*

*Advt. 613*

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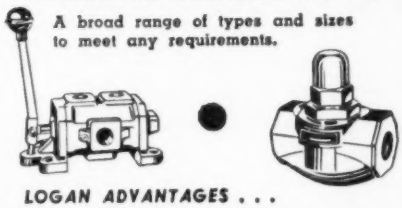
SPEEDS • COORDINATES • REFINES PRODUCTION
IN OVER 10,000 INDUSTRIAL PLANTS

AIR CYLINDERS • AIR-DRAULIC CYLINDERS • AIR and HYDRAULIC PRESSES • COLLET GRIP TUBE FITTINGS • AIR CONTROL VALVES • AIR CHUCKS • HYDRAULIC CONTROL VALVES • HYDRAULIC CYLINDERS • HYDRAULIC POWER UNITS • SURE-FLOW COOLANT PUMPS

**Logan**

## HYDRAULIC CONTROL VALVES

A broad range of types and sizes to meet any requirements.



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- Ease of Installation
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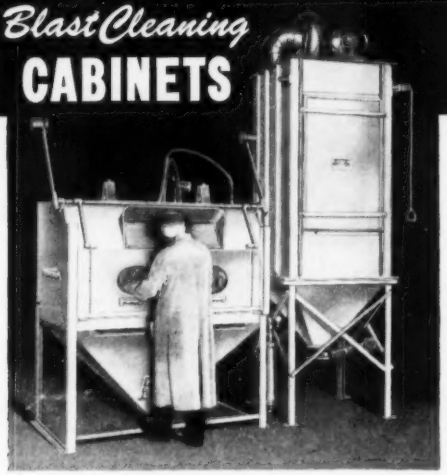
*Blast Cleaning*
## CABINETS



RUEMELIN Blast Cabinets are practical for a great variety of cleaning operations. They are extensively used to remove heat-treating scale and to clean sub-assemblies in metalworking shops, foundries, aircraft factories, etc. Built in many sizes. Furnished complete with dust control equipment. Write for Bulletin 32-B.

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Manufacturers and Engineers SAND BLAST AND DUST COLLECTING EQUIPMENT, WELDING FUME COLLECTORS

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# *Step Up* PRODUCTION *with* ROURA Self-Dumping HOPPERS

—they pay for themselves

Only ROURA Has The Exclusive PATENTED Instant Release Handle

SIMPLE — SAFE — SPEEDY MATERIAL HANDLING

*Imitated by Many— Not Equaled by Any*

## SAVE 50% LABOR-TIME

### Use Self-Dumping Containers

Handling wet or dry, hot or cold, bulky materials quickly and easily, the ROURA is simple to operate—only one man is required for distributing and unloading—and he does this in much less time than ordinarily required under old-fashioned manual methods. Thousands of Roura Hoppers (which fit any standard fork or platform lift truck) are in constant daily operation, serving and saving for such firms as Owens-Illinois Glass, Corning Glass, National Fireproofing, General Motors, Ford, Chrysler, American Brake Shoe, General Electric, Westinghouse, Western Electric, American Steel Foundries, International Harvester, John Deere, etc.

By a simple lift of the exclusive release handle, the ROURA HOPPER dumps, rights and locks itself securely. Sizes—½, ¾, 1, 1½ and 2 cubic yards; the ROURA HOPPER can also be designed for flat trucks and in other sizes to meet specifications. Also, it can be equipped with special flanges that permit stacking to desired tiers for storage or future distribution of materials—conserving valuable floor space. Priced below all competition, the ROURA will quickly pay for itself many times over.

—Can Be Coated With Acid-Resistant Paints

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To assist you in your re-tooling problems . . . or to help you analyze your present welding methods so that you may enjoy maximum speed, efficiency, and economy in many of YOUR production problems...

Giant new 4th Edition contains 62 new photographs, 132 new drawings, 72 pages of helpful data covering basic and advanced welding techniques and designs used in fabricating and assembly. Profusely illustrated with application drawings; weld diagrams; tables of melting temperatures, strengths, corrosion factors; charts; alloy recommendations; etc. Convenient digest size.

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# DATA FILE

(Begins on page 159)

**373 Flexible Hose, Bellows**—Catalog CMH-123, NPH, 16 pp, describes and gives specifications for manufacturer's line of Flexon bellows and flexible metal hose. Information on metallic bellows of stainless steel, brass, bronze and other alloys is included, covering bellows used in many types of control, regulators and thermostatic devices. Flexonics Corp

**374 Plumbing, Heating Supplies**—Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated, gives sizes, intended uses and necessary ordering information. J. A. Sexauer Mfg. Co., Inc.

**375 Magnetic Selection Guide**—Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets, serves as handy guide to the selection of magnets. Dings Magnetic Separator Co.

**376 Rugged Refractories**—Form 5120 is a 12-pp illustrated booklet explaining characteristics of several high quality refractories and telling what each is best suited for. Not an ordering book, covers silicon carbide types, electric furnace mullites, electrically fused alumina refractories and fused cast refractories, discussing their heat resistance, heat conductivity, chemical inertness, resistance to abrasion, spalling. The Carborundum Co.

**377 Air Line Cleaner**—Eight-pp Catalog 252 describes manufacturer's Aridifier, a mechanical device for removing moisture, scale and other impurities from air or gas lines. Explains, illustrates operation, shows some typical applications and gives average cfm requirements. Tells how to select proper size unit, where and how to install it. Logan Engineering Co.

**378 Steam Condensers**—Bulletin 102, 24 pp, is a comprehensive presentation of manufacturer's steam condensers and includes photos of six typical installations as well as a section of engineering data, a discussion of air removal equipment and condenser maintenance. Condenser Service & Engineering Co., Inc.

**379 Industrial Exhaust Fan**—Housing design, wheel construction and standard arrangements of manufacturer's Type EX exhausters are discussed in illustrated Bulletin C-46EX. Provides capacity tables, dimensions and photos of standard and special fan. Bayley Blower Co.

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**LIQUIDOMETER**

*Tank Gauge*

- FOR GAUGING LIQUIDS OF ALL KINDS
- 100% AUTOMATIC
- APPROVED BY UNDERWRITERS' LABORATORIES

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**ARIDIFIER**

*Scrubbed* CLEAN AND DRY

INSTALL ARIDIFIERS ON LINES SERVING

- Paint Spray Guns
- Air Tools
- Air Hoists
- Foundry Jolting Machines
- Sand Blasting Tools
- Sand Blasting Rooms
- Metal Spray Guns . . . or Wherever the line must deliver clean, dry air or gas

On any air or gas line 92% of the dirt, oil, scale and water that enter the Aridifier is trapped and removed from circulation. The Aridifier's patented centrifugal-baffle action scrubs air and gas clean and dry . . . protects equipment, prevents freezing, fouling, corrosion and caking, produces best results with spray gun and air tool operations, etc. Easy to install. Self cleaning. Maintains itself. 10 models available. Capacity 7 CFM to 17,000 CFM.

Learn HOW the Aridifier scrubs with a patented centrifugal-baffle action.

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Here's how to resolve it . . . ECONOMICALLY

Overhead clearance was almost nil. Maximum hook height was very important. A double girder Abell-Howe Crane with under-running trolley was chosen. The crane was custom built but used standardized units to pare down costs . . . Fully warranted it met all requirements—moved loads at surprisingly low expense . . . The instance is typical of what you can expect from Abell-Howe—irrespective of conditions encountered . . . Units come in capacities up to 15 tons; spans up to 60 ft. Get our suggestions. Ask for catalog C 102.

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Line includes wide range of motorized and hand-operated cranes, runways, monorails, electric hoists, storage racks and accessories.

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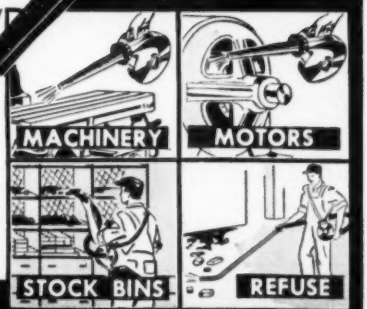
I'm a Clements-Cadillac blower-suction cleaner. I keep your machinery clean . . . no troublesome Dirt, Dust, and Grime gremlins will slow down your smooth operation with me around. I'm a cleaning tool that reaches every nook in all types of equipment.



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PREVENT DAMAGE TO MACHINERY WITH THE . . .

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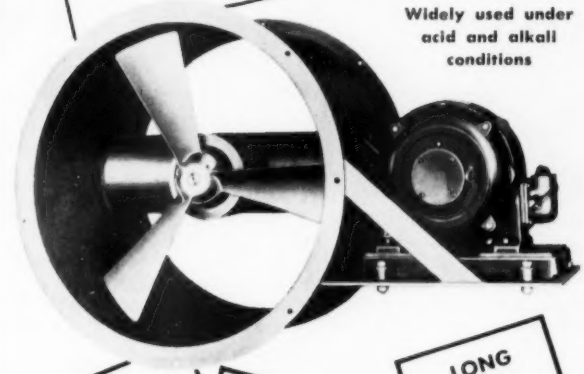
# EXPEL GASES, EXPLOSIVE FUMES AND DUSTS

with Propellair "CS" Fans

Widely used under acid and alkali conditions



HIGH EFFICIENCY

LOW MAINTENANCE

LONG LIFE

■ Propellair's "CS" Fan is a rugged, heavy-duty unit for duct installation. The cast aluminum airfoil propeller is housed in a heavy-gauge steel duct section with steel belt guard and internal bearing support. All-welded construction. *R&M All-Weather Motor* located outside airstream. Sizes from 20" to 60", with certified air deliveries of 3750 to 85,000 c.f.m. Also available with corrosion and abrasion-resisting finishes and with ventilated bearings for high temperatures.

**Simplified Installation**

Propellair "CS" Fans are built to fit standard duct sizes without the need of elbows. The fan drum has front and rear flanges drilled for easy mounting into duct system.

**Write for Bulletin 3082-P. Our engineers will be glad to give you free advice on any ventilating problem.**

PROPELLAIR®
DIVISION OF ROBBINS & MYERS, INC.
SPRINGFIELD • OHIO

Man Cooler Direct Drive Sky-Blast Vaneaxial Extended Shaft

For more facts circle 643 on Reply Card

## Hydraulic Circuits— Their Industrial Applications

(Continued from page 110)

changeover takes place. The unloading valve dumps the oil from the low pressure large volume pump to the reservoir and the high pressure low volume pump finishes the ram stroke and holds high pressure on the workpiece until operator shifts master valve.

Operator shifts master valve and ram will return at high speed. Cycle is completed.

**4. A two pump circuit, Fig. 9.**

By the use of a power unit with two separate pumps, a dual pressure system can be worked out that has numerous applications. By this method a large range of pressures and volumes are available.

Operator places casting onto fixture and shifts handle of master valve A allowing oil to flow to the blind end of clamp cylinders which lock the casting securely in the fixture.

Operator shifts handle of valve B and oil flows to blind end of press cylinder. Piston moves out as bearing is pressed into casting.

Operator shifts handle of valve B and oil flows to rod end of press cylinder.

Operator then shifts handle of valve A to original position and clamp cylinders retract and operator unloads casting from fixture. This circuit eliminates any chance of pressure drop when either master valve is shifted.

Sequencing of hydraulic cylinders sometimes becomes a problem especially in systems where a considerable number of cylinder movements are involved.

### Sequencing Cycles

The next two circuits show a sequencing cycle without the use of sequence valves.

**1. Cycle with three master control valves, Fig. 10.**

Operator loads package onto table and shifts handle of four-way, two-position master control valve No. 4 which allows oil to flow to blind end of cylinder No. 7 and package is moved to elevator platform.

Cam on end of rod of cylinder No. 7 contacts roller of cam operated master valve No. 5 which allows oil to flow to blind end of elevator cylinder No. 8 and elevator rises to end of stroke.

Elevator platform contacts cam operated, four-way, two position valve No. 6 and oil flows to blind end of ejection cylinder No. 9. Package is ejected from platform.

Operator shifts handle of valve No. 4 to original position and ram of cylinder No. 7 retracts, then elevator starts to retract and ejector piston retracts, completing the cycle. This layout assures positive sequencing at all times. It does not depend upon pressure build-ups to affect the sequence.

**2. Sequencing by use of cam drive, Fig. 11.**

By selecting a cam drive as the control means, numerous cylinders may be operated in sequence.

Operator engages clutch on cam drive which depresses the roller on each four-way, two position valve in sequence. This, in turn, operates the rams in the forward and reverse motion.

Whenever operation is completed, operator disengages clutch and cycle stops.

### Tear Sheets of Articles are Available

**Readers wishing tear sheets of any article appearing in the issue for their personal files may obtain them by indicating the item desired on one of the post cards appearing in this issue. This offer is good for three months after date of issue.— Editors**

*Low Cost Protection for*

**HEAT EXCHANGER TUBE ENDS**

In the past 31 years Conseco has provided millions of Flowrites for tube inlets of heat exchangers operating in all industries and all applications. Tube inlets become eroded and worn long before the remainder of the tube, and by reinforcing the inlets it is possible to increase the effective tube life many times.

Flowrites—made of the same metal as the tubes—are available in any length, diameter or gauge. They are easy to install and remove by unskilled help. When Flowrites themselves become worn (*instead* of the tubes!), just pull them out and install new, longer Flowrites.

Get the facts from the 8-page Flowrite "proof" booklet, available upon request.

**CONDENSER SERVICE & ENGINEERING CO.**

75 RIVER ST., HOBOKEN, N. J.

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**NOT THIS...**

Now...for a good shower

—deep freeze!

+—scalding hot!

BANISH "BOOBY TRAP" SHOWERS

Use POWERS THERMOSTATIC Water Mixers

**BUT THIS**

Real comfort and safety. No waste of time or hot and cold water.

**POWERS** THERMOSTATIC **WATER MIXERS**

**—eliminate shower accidents**

They are completely automatic, hold shower temperature wherever you want it regardless of **pressure** or **temperature** changes in water supply lines. Failure of cold water instantly shuts off the shower.

Tests prove Powers is safest shower regulator made for factories, schools, hospitals, hotels and clubs. Thousands now in use.

**Used for Many Industrial Processes.** Users report control within ½° F. Temperature Ranges: 65-115° F., 60-125° F., 75-175° F. Write for Bulletin 365. (b13)

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all fouled up--

MUCKLE VENTS CAN HELP YOU

No problem too tough-whether your air is London Fog thick or Sahara Dry-gaseous or dusty- smoky or hot . . . MUCKLE VENTS remove it quickly and efficiently. These streamlined, propellerdriven,roofmounted ventilators are designed with motor out of the air stream to effectively pull out either wet or dry air. MUCKLE VENTS are a completely weatherproof packaged unit ready to be installed with a minimum of expense and work, available in wide range of 15 sizes from 254 CFM to 10280 CFM.

LET MUCKLE VENTS INCREASE EFFICIENCY IN YOUR PLANT!

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BEAVER

NOW AVAILABLE!

No. 2 ⅛" to 2"—1 wheel $ 9.85
No. 2X ⅛" to 2"—3 wheel $10.45
No. 4 2" to 4"—1 wheel $33.00
No. 4X 2" to 4"—3 wheel $33.50

PAT.

BEAVER presents . . .

2 new and better pipe cutters

EASIER CUTTING . . . because the pressure is applied directly to the wheel

- Follows sound engineering principle. Feeds cutter directly into the pipe. Cutting is faster, easier, with less effort!
- Streamlined, balanced shape fits hand perfectly for easier operation!
- Rugged but light. Tough and long-wearing, oven-dried, smooth, baked lacquer finish!

THIS

Power applied to point of cutting . . .

NOT THIS

Feeding rollers into work divides power, sets up wedging action . . .

For Better Pipe Tools . . . Buy BEAVER

210-300 DANA AVE. WARREN, OHIO

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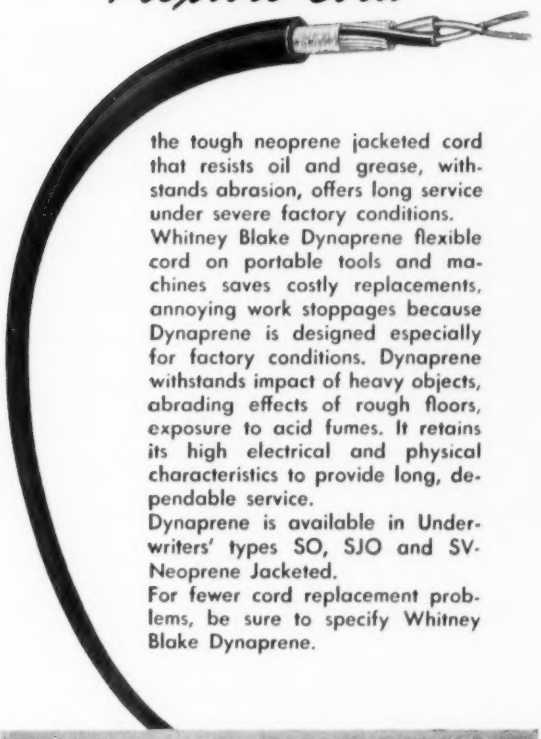
CUT CORD REPLACEMENTS

SAVE ELECTRICIANS' TIME

REDUCE PORTABLE TOOL DOWN TIME

with DYNAPRENE® Flexible Cord



the tough neoprene jacketed cord that resists oil and grease, withstands abrasion, offers long service under severe factory conditions.

Whitney Blake Dynaprene flexible cord on portable tools and machines saves costly replacements, annoying work stoppages because Dynaprene is designed especially for factory conditions. Dynaprene withstands impact of heavy objects, abrading effects of rough floors, exposure to acid fumes. It retains its high electrical and physical characteristics to provide long, dependable service.

Dynaprene is available in Underwriters' types SO, SJO and SV-Neoprene Jacketed.

For fewer cord replacement problems, be sure to specify Whitney Blake Dynaprene.

WELL BUILT WIRES SINCE 1899

WHITNEY BLAKE CO.

NEW HAVEN 14, CONNECTICUT

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# SELLING LIKE HOTCAKES!

***Where Concrete Floors Are Pitted and Ruined by Acids, Alkalies, Grease, Oil or Excessive Water***

## STONHARD STONPACH *IS THE DEAL!*

No other repair material can compare with STONPACH for smoothing out ruts and holes in factory floors. Hard usage can't touch it! It resists chemical reaction and sets up flint-hard at only ½ inch thickness. Furthermore, ALL INGREDIENTS COME COMPLETE IN ONE PACKAGE—NOTHING ELSE TO BUY! Find out today, how your own men can make a patch, or do a complete overlay. Write for our *free* STONPACH BOOKLET.

## STONHARD COMPANY

***Building Maintenance Materials Since 1922***

**104 Stonhard Building, 1306 Spring Garden St., Philadelphia 23, Pa.**

Yes, I want details on STONHARD STONPACH 104/7/53

Name.....

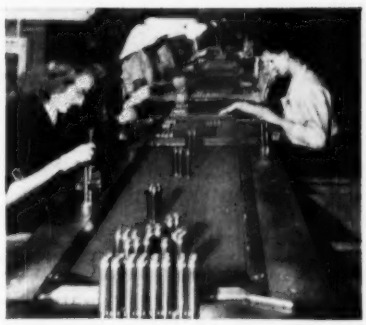
Company..... Title.....

City..... Zone..... State.....

**For more facts circle 649 on Reply Card**

# IF YOUR BELTS WORK OVERTIME . . . be sure they're Imperial!

**This one has carried 48 million shells!**



This Imperial Belt has been on the job in the shell-manufacturing plant of Nesco, Inc., at Milwaukee since January, 1951—running 16 hours a day, 5 or 6 days a week. It is one of three Imperial Ordnance Special Rexall Inner-Locked Conveyor Belts, 18" x 4-ply, 107 feet long, used to convey 20 MM shells along the inspection lines. This is not the first national emergency in which Imperial Belting has served Nesco. From 1942 until 1945, six belts of the same type carried 150 million shells down the line. One of these belts is still running today, on another job for Nesco.

### Belting Job-Designed for You

Imperial Ordnance Special Rexall is another belt engineered by Imperial for specific job requirements. Its plies of tightly-woven, finest heavy-duty hard silver duck are double-stitched with inner-locking stitches which positively prevent ply separation. It possesses a high resistance to gouging, abrasion and impact, and to the drawing and cutting compounds used in cartridge plants.

Whatever your need, there is a job-designed Imperial Belt to fill it and cut your handling costs. Write for Data Sheet 51-9 and prices.

**Imperial BELTING CO.**

*1759 S. Kilbourn Ave.*
*Chicago 23, Illinois*

**• ENGINEERED BELTING — THE RIGHT BELT FOR EACH JOB •**

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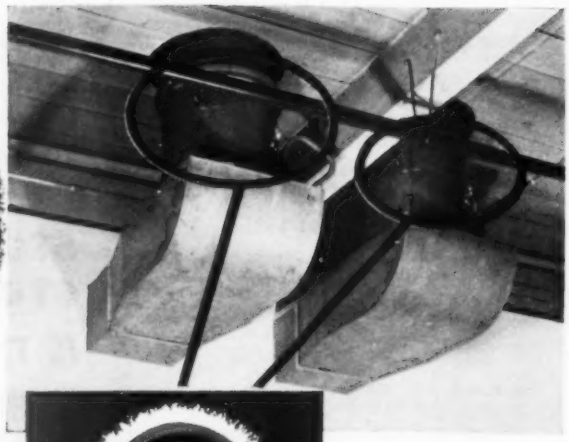
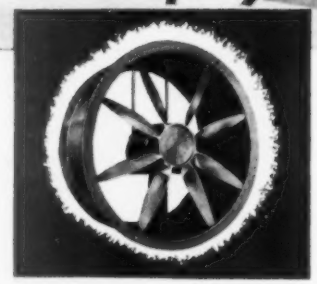
## in Park Ridge, N. J.

# Mittag & Volger, Inc. RELIES on HARTZELL fans and blowers





**DUCT FAN**

Sizes from 12" to 60". Belt or direct drive. Single propeller, two-propeller and multi-blades styles. As easy to install as a section of duct.

There's a Hartzell fan or blower to meet every industrial air-moving need. At the Park Ridge, N. J., plant of Mittag & Volger, Inc., manufacturers of carbon paper and inked ribbons, more than 20 different Hartzell units have proved that when air-moving problems are getting you down it pays to rely on Hartzell.

Shown at right above are the two Hartzell direct-drive duct fans which are used for rest room exhaust. The lower photo shows the three Hartzell 28" Lo-Noise Fans which provide *quiet*, efficient ventilation for the mill room. Roof ventilators and unit heaters are also counted among the Hartzell equipment giving dependable service at Mittag & Volger.

The right equipment, properly used, will beat even the toughest air-movement problem. The right equipment? Hartzell has been a leader in the industry for more than a quarter of a century because Hartzell engineering and quality workmanship are concentrated on *one* objective—more efficient, more economical air-moving equipment for *industry*. The right installation? Your nearby Hartzell field office puts the engineering "know-how" of the whole Hartzell organization right in your back yard.

Send us the details of your air-moving problem today. (And send for Catalog B-10, with details on the new line of Hartzell centrifugal blowers.)

***The installations shown in this advertisement were handled by the Hartzell field office at 1440 Broadway, New York 18, N. Y.; telephone PEnnsylvania 6-0277.***

**LO-NOISE FAN**

For installations where noise level must be kept low; special air-foil blade gives full efficiency with slow tip speed. Sizes from 24" to 60".

# HARTZELL propeller fan co.

Div. of Castle Hills Corp.

Dept. S

**PIQUA, OHIO**

*PROPELLER-TYPE FANS • BLOWERS*
*ROOF VENTILATORS • UNIT HEATERS*

*ENGINEERING OFFICES IN PRINCIPAL CITIES*

Name _____
Company _____
Street & Number _____
City & State _____
If student, check here for special information ☐

**For more facts circle 651 on Reply Card**

# TRAMRAIL TRANSFER CRANES *SYSTEMATIZE* HANDLING IN STEEL WAREHOUSE

The large storage area is completely covered by Tramrail crane service. Every item can be seen from the floor and readily reached with the two transfer cranes.

▲ The Tramrail transfer cranes make it easy to place the long unwieldly pipes and bar stock into storage at any height. This makes for orderliness, which is an important factor in securing high operating efficiency.

THE BIG modern warehouse of J. M. Tull Metal & Supply Co., Atlanta, Georgia, was designed to make use of overhead Tramrail equipment to enable the handling of large unit loads in and out of storage with the least effort and in the quickest time.

The principal storage section is provided with two parallel runways each having three tracks. On both runways is a 64-foot transfer crane that travels the length of the room. Cross-overs are provided, enabling a hoist carrier transferring from one crane to the other. This makes it possible to haul materials between any two points in the entire area without rehandling.

Steel is constantly on the move in this active plant. From 60,000 to 70,000 lbs. are brought in by railroad car daily and like amounts are shipped out. The material is unloaded from railroad cars at one end of the building and placed into storage. It is shipped out on trucks which are loaded at the other end.

The overhead crane system makes it possible to place incoming materials into allotted storage spaces at once. The need of storing temporarily in aisleways or other areas and extra handling which this entails is eliminated. Thus, the warehouse is kept orderly at all times and every item is readily seen and conveniently reached. Danger of handling accidents is minimized and overall efficiency is unusually high.

***GET THIS BOOK!***

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

**CLEVELAND TRAMRAIL DIVISION**
THE CLEVELAND CRANE & ENGINEERING CO.
7581 East 284th St. WICKLIFFE, OHIO.

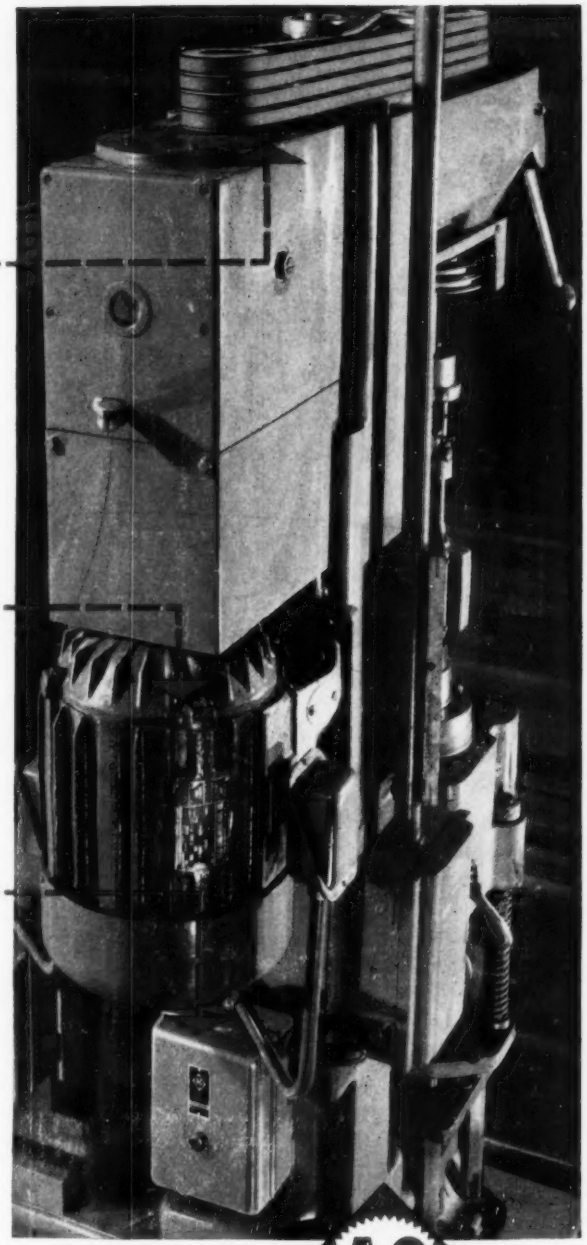
**CLEVELAND TRAMRAIL**
**OVERHEAD MATERIALS HANDLING EQUIPMENT**

For more facts circle 652 on Reply Card

# Designed to Work Together

## Texrope Drives

*Texrope* V-belt drives, the original multiple V-belt drive, are available in a complete range of types and sizes, both fixed and variable speed. More and more machine designers are finding the moderate cost of *Vari-Pitch* sheaves is returned many times in increased machine versatility and more precise quality control. With either Stationary Control or Motion Control *Vari-Pitch* sheaves, speeds can be accurately adjusted quickly and easily over a wide range.



## Motors

The increasingly high cost of maintenance labor has made the use of totally-enclosed, fan-cooled motors on machine tools more popular — and more profitable — than ever. This Allis-Chalmers TEFC motor is especially well suited to this application because it has no enclosed cooling air passages. Since all cooling surfaces are exposed, the motor is easy to clean with cloth, air or vacuum cleaner. Even with the oily atmosphere of many machine shops, dirt wipes off easily.

## Motor Control

Allis-Chalmers motor control is available for most designers' applications from size 0 up. Allis-Chalmers builds many types of squirrel cage and wound rotor motor control, dc motor control and variable speed control for many applications. Shown here is a full voltage across-the-line starter with reset button.

## *Nation Wide Service*

Nearly 100 Allis-Chalmers Certified Service Shops throughout the country provide factory-approved parts and service on Allis-Chalmers drive equipment. Complete information on special equipment also is provided.

Get the help of your Allis-Chalmers District Office representative on your drive plans. Call him or write for Bulletins 51B6052, 20B6051, and 14B7733. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4005

*Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks.

A-C ALLIS-CHALMERS

# ALLIS-CHALMERS

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AUGUST, 1953

# Plant Engineering

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The magazine that helps plant engineers with their everyday problems